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A MONOGRAPH

OF THE

MEMBRACIDÆ

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2000

A MONOGRAPH

OF THE

MEMBRACIDÆ

BY

GEORGE BOWDLER BUCKTON, F.R.S., F.L.S., F.C.S.

TO WHICH IS ADDED A PAPER ENTITLED

SUGGESTIONS AS TO THE MEANING OF THE SHAPES AND COLOURS OF THE MEMBRACIDÆ IN THE STRUGGLE FOR EXISTENCE

BY

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PREFACE

Dr. Samuel Johnson remarked "that every author assumes that he can impart something to the public, and that if he fails to excite interest he has no real cause of complaint to make against fair criticism." But the importance of a subject cannot always be gauged by the interest it excites, for originality consists in breaking new ground and exploring untrodden paths. This is the aim and object of the pioneer.

The activity of this age tends to the extinction of many species of high interest to the zoologist. Wild animals and insects become rare, and perhaps they may entirely disappear. The present volume, though admittedly incomplete, is offered partly by the assistance of its portraiture and partly as an invitation to others to study the economy of a remarkable family of insects. Their unique forms will give the microscopic student much food for thought, and repay his investigations as to their economies.

Those who use the camera lucida in conjunction with the microscope are well aware that, with its signal advantages, the prism has defects, so far as exact drawing is concerned. The projection of the image of an object must proceed from a single point, consequently the outer limits of a field of view, seen through a prism, to a small extent will be unduly expanded on the paper used for drawing. The object, say of a flower or an insect, is not seen all on the same plane, and the eye must accommodate itself by practice to allow for the different foci adapted for different depths.

Again, an insect, if small and unset, must have its limbs fore-shortened, and then the drawing may not appear to be symmetrical.

Allowances will thus be made by critics, who may complain of a want of proportion between the two sides of some drawings. This defect might be cured by the engraver, but this correction cannot be expected of him, whose task is often strictly to reproduce the figures set before him.

With respect to colour-representation, it must be remembered that some light is always lost by transmission through prisms and lenses. Enlarged figures of insects are liable to appear with less contrast than when seen of their natural size. It is not easy to concentrate sufficient daylight on an object, and artificial light, unless it be that from electricity, tends to obliterate delicate shades of blue and green.

The author offers his best thanks to those, both at home and abroad, who have generously assisted him by loans of insects. Except through the good help given by others, this monograph would have lost whatever scientific value it may now possess.

Amongst these efficient helpers have been the Rev. Canon W. W. Fowler, Mr. W. L. Distant, Mr. W. F. Rosenberg of Ecuador, Mr. Rippon, Mr. E. E. Green of Ceylon, Mr. J. O. Tepper of Adelaide, Mr. Chas. Lounsbury of Cape Town, and Dr. C. Aurivillius of Vienna. Particularly the author's thanks are due to Mr. W. F. Kirby, of the British Museum, for his assistance in overlooking proofs, and suggestions. The author also feels under great obligation to Professor E. B. Poulton for his valuable chapter on "Suggestions as to the Meaning of the Shapes and Colours of the Membracidæ in the Struggle for Existence."

Finally, for the interest shown by the author's daughters in the subject, for the apt resetting of small insects more suitably for drawing, and for other assistance, the author expresses his affectionate recognition.

Freedom of thought is a necessary condition of all scientific inquiry, which amongst other considerations includes the intricate problems of biology.

Modern reflection more and more gravitates to the ancient postulate of a benevolent Creator of all material and vital energy. Lord Kelvin remarks, "that there is nothing between absolute scientific belief in a creative power, and the acceptance of a theory of a fortuitous concourse of atoms. . . . It is absurd to think that lapse of time could produce a living animal, much less the miracle of human free-will and thought."

Evidence of purpose appears through the pages of this memoir. The author hopes that in it something may be found which will add to our knowledge of nature, and tend, in Lord Bacon's words, "to the Glory of God and to the relief of man's estate."

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BIOGRAPHICAL LIST OF TITLES OF MEMOIRES CITED (l.c.).

Amyot and Serville	Hemip. Hist. Nat. des Insects, 1843.
Atkinson, E. T.	Indian Rhyncota, Jour. Asiat. Soc. of Bengal, 1885.
Bolivar	Essai sur les Aeridiens. Gard. 1887.
Burmeister	Handb. der Entom. 1838.
Butler, A. G.	Cistula Entom.
De Geer, Carl	L'histoire des Insects, 1778–1783.
Fabricius	Syst. Rhyngotorum, 1787.
Fairmaire	Ann. Soc. Entomol. de France, 1846.
Fallus	Revue d'Entom. 1890.
Fowler, W. W.	Biologia Centrali Americana, Rhyn. Hemip. vol. ii. 1894.
Germar	Silberman's Revue Entomol. 1835.
Goding, F. W.	Trans. Canadian Ent. Soc. vol. xix. 1892.
Guérin	Icon Règni Animal, 1829–1843.
Hope	Linn. Soc. Trans. 1825.
Kirby, W. F.	Mag. Nat. Hist. 1829.
Laporte	Ann. Soc. Entom. de France, 1832.
Latreille	Hist. Naturelle Hemip. 1802.
Lessing	Illig. Zool. 1833.
Linnæus	Systema Naturæ, 1755.
Merian	Insec. Surinam, tom. v.
Olivier	Entomologie (8 vols.). Paris, 1789.
Pertey	Del Ausen Arl. Brazil.
Riley, Chas.	Reports. Insect Life, vol. v.
Say	Jour. of Acad. Natur. Sein. Philadelphia.
Scheller, H. J.	Drie Membracid. Surinam. Tidschript. Entomo. Nederland.
Stål	Kongliga Swenska Vetruskaps Academ. Handlengar, 1869.
,,	Hemiptera Africana, vol. iv. 1864.
,,	Ofvers Kong. Vet. Aka. Förh. 1869.
Stoll	Representation des Cigalles, 1787. Plates.
Walker, F.	List of Hemiptera in the Brit. Museum, and Supplement, 1851.
,,	Insect Saundersiana. 1858.
Westwood, J. W.	Modern Classification of Insects. 1839.

SKETCH TABLES OF GENERA.

Reliable dichotomous tables of genera are of great help as giving a short cut to the identification of species; but such tables must be used with caution, for it is impossible, within small limits, to do more than direct study into certain lines, founded on characters which, after all, may not prove to be natural. Linnæus modestly met the objections made to his classifications that they were not natural, "that he was willing to adopt such a natural system, when it was found, and that it would be preferable to his own artificial system"; which in the instance of botany was based on the sexes of plants. His words in extenuation of his own incompleteness of knowledge in natural things, I may be allowed to quote, as addressed to Dr. Haller, of Gottingen, in 1737: "If you detect any mistakes of mine, I rely on your superior knowledge to excuse them; for who has ever avoided error in the wide and extended field of nature? . . . I am still a learner, not learned."*

The following tables are constructed primarily on the forms of the pronotum (which in the Centrotidæ are thought to be distinctive), and secondarily on the character of the suprahumeral processes. The neuration of the wings is not here considered, as it appears to be too vague from its variability, though Stål and also Dr. Goding have studied the characters. My figures have been drawn simply as they appear under the miscroscope, and without the trammels of any hypothesis to modify them.

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* Sir J. E. Smith's "Correspondence of Linnæus," vol. ii. p. 234 *et seq.*

EXPLANATORY KEY TO THE ARRANGEMENT OF THE FOREGOING GENERA.

	Character of Horn.	Genera.	Plate and Figure.		Character of Suprahumer
I. With Posterior Horn and with Suprahumerals.	A Ulnate	Anchon	49	1	*b*
	B Arcuate	Centruchoides	50	6	*b*
		Leptocentrus	53	5	*c*
	C Sinuate	Ophicentrus	57	1	*c*
		Tricoceps	56	8	*f*
	D Dentate	Centrotus	55	7	*f*
		Campylocentrus	55	8	*f*
		Gnamptocentrus	56	1	
		Sphærocentrus	56	4	*f*
		Pedalion	57	8	*b*
	E Clavo-serrate	Polocentrus	58	2	*f*
	F Recto-linear	Rabduchus	57	4	*f*
		Ceraon	51	1	*h*
	G Unci-nate	Daimon	55	4	*d*
	H Subulate	Oxyrhachis	49	3	*a*
		Daunus	50	2	*b*
		Sextius	51	3	*f*
		Pterosticta	51	7	*f*
		Megaloschema	52	2	*b*
		Otinotus	52	3	*j*
		Centrotypus	54	2	*d*
		Ibiceps	55	2	*e*
		Taurina	60	9	*f*
	I Calcate	Smerdalea	58	5	*f*
	J Obsolete	Pyramba	58	5	*f*
		Pogon	58	6	*f*
		Otaris	59	1	*k*

EXPLANATORY KEY TO THE ARRANGEMENT OF THE FOREGOING GENERA—*continued.*

	Genera.	Plate and Figure.	
II. Posterior Horn without Suprahumerals.	Ischnocentrus	59	2
	Phærotus	59	3
	Psilocentrus	59	5
	Phaulocentrus	59	7
	Mærops	59	8
	Gargara	59	9
	Emphusis	59	6
III. Without Horn with Suprahumerals.	Platycentrus		
	Tolania ♀	60	4
IV. Without Horn or Suprahumerals.	Brachybelus	60	1
	Tolania ♂	60	3

CHARACTERS OF POSTERIOR HORN.

A. Ulnate.
B. Arcuate.
C. Sinuate.
D. Dentate.
E. Clavo-serrate.
F. Rectilinear.
G. Uncinate.
H. Subulate.
I. Calcate or spurred.
J. Obsolete.

CHARACTERS OF SUPRAHUMERALS.

		Plate.	Fig.
a.	Approximate	49	3
b.	Truncate	50	3
c.	Arcuate, bowed	53	5
d.	Palmate, flattened	54	4
e.	Falcate, scythe-like	55	1
f.	Conate	56	7
g.	Divaricate, wide apart	55	5
h.	Clavate, clubbed	51	2
j.	Subulate, awl-shaped	52	3
k.	Auriculate, eared	60	1

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INTRODUCTION.

One of the glories of Creation consists in the infinite variety therein displayed. In the department of Biology this diversity is nowhere better shown than in Entomology, in which form, colour, and adaptability of structure are subjects of the highest interest.

The family Membracidæ here illustrated, will in novelty nowhere yield the palm to other insect groups. The great divisions of the insect-body into head, thorax, and abdomen, have in the Homoptera each their own special abnormal developments, which may be exemplified by the gigantic head of the lantern fly, *Fulgora laternaria*, the extraordinary contortions and expansion of the thorax in *Heteronotus bicinctus*, and the inflated bladder-like abdomen of the Cicada, *Cystosoma saundersii.*

It has been thought that the larger part of the animal matter of this globe is locked up in insect forms. Few, indeed, consider how these comparatively small animals are so much concerned in human economy. Out of the two hundred and sixty thousand insects already named, eighteen thousand are Hemiptera or bugs, and of these insects the Homopterous Membracidæ are somewhat important in point of number. It is computed by Mr. W. F. Kirby that up to 1898 inclusive, about one thousand one hundred and fifty species have been noted or described, and this number might be probably doubled with safety, when we consider our ignorance of the sub-tropical parts of many regions of the world.

The question may be asked, Why are we so ignorant of these curious forms? This may partly be answered by the fact that what we call extraordinary developments of parts are to be noted in some inverse ratio to the magnitude of the living forms, and therefore interest in certain small forms cannot be excited through the naked eye, but recourse often must be made to a lens or a microscope to elicit sufficient interest in them.

The Irishman's apology for the smallness of his pig, that "he is very wicked," may be permitted for the Membracidæ, for this quality, so far as appearance goes, may be urged as a point of interest, for many are grotesque if not diabolical in appearance, and might suggest some of the gruesome shapes represented by the Italian painter Orgyia, in the famous frescoes of the Campo Sancto of Pisa.

But the British neglect of this family is also due to the fact that it is exotic. Most scientific biologists up to the present have been European in birth, and obviously those objects close to hand would come first under their observation. The brilliant colours of the butterfly and the metallic hues of the humming-bird easily secure their votaries, whilst the sombre colours of Hemiptera are in great measure neglected by many entomologists.

Times of little things are, however, at hand. "Natura de minimis admiranda." The microscope is indispensable for the study of bacteriology, and for tracking the spread of malaria through the agency of the gnat's proboscis, or, again, the occurrence of Filaria and the parasite of Tsetse in the blood of animals.

The larger Membracidæ do not exceed two English inches in the expanse of their wings, but the smaller forms call for the use of a good lens to show the peculiarities of their structure.

If we could give the Membracidæ a bad name, some interest in the family might be excited, but their characteristics on the economical side are chiefly negative. They possess no bad odour, for they show no stink glands, which are the objectionable marks of many Hemiptera. They do not irritate animals by their skin-punctures, for they are exclusively vegetable feeders. They are not in sufficient numbers to distress the agriculturalist by doing injury to his crops, though Professor Riley says *Ceresa bubalus* injures the potato and the apple in certain parts of North America.

Some of those who may inspect the plates of this monograph may feel an inclination to laugh at the grotesque outlines shown by species typified by *Sphongophorus rediculus*, but these forbidding aspects belie their life-history, so far as we know it, and thus the porcine wickedness, hinted at a few sentences in advance, has yet to be proved by the field-naturalist, who has much, however, to teach us as to the habits and economy of the Family.

In a more serious mood the student may remember that the Hemiptera, perhaps more than any other insects, are connected with the welfare of the human race. If their natural enemies were withdrawn, man's starvation would ensue from the destruction of vegetation! The wonderful multiplication of Aphididæ and large Cicadidæ, and their voracity even now affect our industries.

CLASSIFICATION.

Few things help forward an enquiring mind more than original research, and if this be directed into comparatively untrodden paths, the interest is enhanced. If creative or developmental energy has been exerted in any direction, our own intelligence cannot be wasted or misapplied in the investigation of such by-paths, and in testing the modes by which phenomena are brought about in the evolution of minute life.

Although exact science must deal with the concrete, it seems that prolonged experiment finally leads us to the abstract. The horizon widens, but its confines nevertheless still remain unknown. Classification brings order out of seeming chaos, but it cannot bring to us finality. Classification need not mean explanation, and very often does not attempt it, but it may show sequence and proof of adaptability. Considering our present ignorance of the life history of Membracis, it will be safe at present to classify the family solely on the external anatomy of the adult insect.

From want of material, the important subject of metamorphosis, and the lessons it must surely teach, necessarily occupies a very small portion of this treatise.

Divested of their extraordinary pronotal adjuncts, the bodies of Membracidæ show nothing very remarkable from those of other Homoptera. The insects may be said to be complete as to their general forms without these adjuncts.

Nature would seem to have been in her playful mood when she contrived and adopted these *apparently* useless additions. They tempt us to ask in what consists their æsthetic beauty. But monotony seems to imply poverty of invention; whilst variety as a charm is conceded by all, and is to be recognised in the incessant evolution and involution of things as we know them.

As before noted, the Imagoes of the Membracidæ form the chief interest in their metamorphic changes. The Pronotum is the great obvious character in any general review of species.

The Membracidæ, being haustellate or sucking insects, were included by Linnæus in the order Hemiptera, and later by his pupil Fabricius under its equivalent Rhynchota. It soon became necessary to break up this group into numerous genera, of which modern systematists now recognise more than one hundred, even at a low computation.

The position of the Membracidæ may be briefly shown by the following table :

	Sub-orders.	Section.	Families.	Sub-Families.
Order Rhynchota.	Heteroptera.		Scutelleridæ. Cimicidæ. &c. &c.	
	Homoptera.	Monomera	Coccidæ.	
		Dimera	Aphidæ.	
		Trimera	Cicadidæ.	
			✓O Ledridæ.	
			Membracidæ	Membracinæ. Darninæ. Tragopinæ. Smiliinæ. Hoplophorinæ. Centrotinæ. Æthalioninæ.
			✓ O Fulgoridæ.	
			Cercopidæ.	
			Jassidæ.	

With reference to the classification of a group of animals, an ordinary observer might at first think that the task would be easiest where there was found to be the greatest variety of form. This does not necessarily follow. Diversity may proceed from a departure from a few marked types, perhaps originally constant; or, on the other hand, from the types themselves as numerous, and yet liable to modification.

The great variety of form in the Membracidæ seems to be a hindrance rather than an assistance to a natural classification, when it is found that characters, thought good as generic in some families of insects, are sometimes found not constant even in the sexes of other families. Facts of metamorphoses and life-history here are great and almost indispensable desiderata for a natural arrangement.

William Macleay well observed that any Entomological system which does not concern itself with the phenomena of metamorphoses, in fact, ignores the existence of half the insect world.

The study of adult forms alone, when the wants of the previous life which may have been so essentially different from those afterwards developed are ignored, must be in many ways deficient. Yet this deficiency must be tolerated if the life-histories of the insects are obscure. A whole history is possible only when materials are abundant for the study.

Our classifications are, for the most part, arbitrary. We may attempt such either by a process of eliminating parts of structure which we may consider of secondary importance, and thus work for the discovery of a type; or we may infer the evolution of organs which rise into existence through the exigencies of the surroundings of the insects. The first might be a partial degradation, the second a slow development.

Carpenter remarks, "It is impossible to draw hard and fast lines between species and variety, for the use of these terms must depend on the knowledge and opinion of the naturalist." Thus, some would make it easy to sweep away by the stroke of a pen the conditions of sexual sterility as a test; but the question is not to be dismissed lightly by a consideration of the mere facts of hybridism.

The older writers on the Membracidæ may be thus noted in sequence. Linnæus, Fabricius, Caspar Stoll, Latreille, and a little later, Germar, Burmeister, and Amyot and Serville. All published descriptions of species of the family, and sometimes with a few figures to help in their identification.

But it was not until Dr. Léon Fairmaire's *Revue de la Tribu des Membracides* appeared in 1845 and 1846 in the *Ann. Soc. Entom. de France*, that the literature of the family took definite shape. Since his time, we have had the labours of Stål, Walker, Goding; and quite recently, the memoir of Canon W. W. Fowler, whose monograph forms one of the valuable contributions to the spirited and important addition to scientific history so liberally made by Messrs. Godman and Salvin in the *Biologia Centrali Americana.*

Briefly it may be remarked that Caspar Stoll's third volume was published in Dutch and in French at Amsterdam in 1788, before Linnæus' famous binomial system of nomenclature was fully adopted. Consequently the figures given in Stoll's *Representation des Cigales et des Punaises* are not easily identified with insects of the present day, though the coloured copperplate figures are carefully executed, and the descriptions are good so far as they go.

Fairmaire's *Revue* is important. It is accompanied with five plates in plain outline, which characterise the genera and some of the species he describes and tabulates.

Dr. Fairmaire had temporary possession of the rich collections of Maximilien Spinosa, and of Professor Germar of Halle. He studied also the cabinets of Messrs. Signoret, Serville, and Lefebvre. Professor Westwood lent him many "espèces très curieuses" which had been collected from the East Indies and parts of Mexico.

In great measure I rely on the synonomy furnished by so great an adept as Dr. Fairmaire, in those cases where a personal comparison of species has not been attainable by me.

He represents the Membracidæ as being all Phytophagus. They leap with great facility, and they can also use their wings for short flights from tree to tree. Some live in communities, whilst others form smaller groups, their location being much governed by the character of the vegetation, the substance of which they puncture for the juices required for food.

At present the early life-history of the family is obscure, and we are ignorant even of the metamorphosis of the only three or four European species which represent it.

The natural position amongst insects is that between the trimerous Cicadidæ, and the Circopidæ, or Frog-hoppers.

The Membracidæ have been supposed to supply the place of Aphidæ in semi-tropical countries, but this is hardly true, for communities of both families can be found spread over the same areas of country.

Their geographical range is wide, for the species affect not only countries which are subject to great cold, as is found in Canada and the North of the United States, but they are numerous under the tropical heats of Brazil, the Amazons, and Ecuador. The more temperate regions on the slopes of the Himalaya, and the high grounds of Central Africa, are also rich in examples.

The extraordinary and striking forms of *Sphongophorus clavatus*, *Bocydium globularis* and *Umbonia spinosa* were known to Linnæus, to Stoll, and Coquebert. William Kirby and William Spence perhaps first suggested the theory of protective disguise, as an explanation of the lichen-like, fungoid, and thorny exteriors of these species, and of many of the examples contained in these genera.*

The works of Carolus Stål are numerous and scattered, but they lose much of their value as they are without figures. His tables are often obscure in their definitions. Thus such terms of qualification as sæpissime, levissime, and raro paullo, should be as far as possible rejected, as bewildering to the searcher. His work on the African Membracidæ in Vol. IV. of the "Hemiptera Africana," 1864, however, appears to be our best guide at present to these insects of that Continent. These species in great measure belong to the Centrotidæ and their allies, which are the last to be treated, in this monograph.

A number of species are named by Mr. Francis Walker, and are preserved in the cabinets of our National Museum. Some are type specimens, single and unique. In great part they are more or less sufficiently described in "Walker's List of Homoptera in the British Museum," but some of these I have not been able to figure here. Mr. Walker added several new and good genera to the family of Membracidæ.

Canon W. W. Fowler's monograph, above alluded to, is the most important memoir that has occurred up to present date. It is profusely illustrated by coloured plates. Had it not been confined to the insects of one portion of the world only, it might have served as a convenient text-book for the student, except for its cost; and from the fact that it cannot be obtained separately, as it forms part of a long series of volumes on Central America, and is attainable only by a few. These considerations may be accepted as some apology for the appearance of this present monograph.

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* Kirby and Spence, Intro. to Ent., vol. ii. p. 182, fifth edition, 1843.

Before closing this sketch of the classification of Membracidæ, attention should be drawn to a synoptical scheme proposed in 1892 by Dr. F. W. Goding, relating to the Homoptera of North America. He takes the six sub-families adopted by Stål, commencing with Centrotinæ (in which the Æthalioninæ are included), and placing Membracinæ the last but one of the group.

His scheme is in great measure based on the structure ot the alary organs. Measurements of the delicate wings, such as half the length of the tegmen, are difficult to verify without dissection. In such cases we must accept authority for a genus, whilst unable perhaps to prove the conditions necessary for its identification.

After all, the neuration of the wings in this family, taken by itself, does not well arrange the grouping. What may seem to be a closely allied genus may show a diverse venation of tegmen. Supernumerary areas and transverse nervures may be the results of degradation of the typical organs or due to a slow development.

We may assume that the constancy of neuration is in proportion to its simplicity. We have little difficulty in deciding to what section a winged aphis belongs, but as to Membracidæ, Canon Fowler remarks: "The complex characters of this family make the genera difficult to observe, as they run very closely one into the other, and it is hard to draw the line anywhere."

Dr. Goding, in his paper above noted, gives us help towards grouping the difficult sub-family of Centrotinæ. At present the confusion of genera is great, and the synonymy involved. He holds out to us some hope that in a future memoir he will clear away some of these intricacies.

Amongst other recent and living authorities may be mentioned Dr. Handlirsch, Dr. Aurivillius, Dr. Ganglbauer, and M. Severin.

In India the Membracidæ are well represented; at least, the late excellent Entomologist, Mr. E. T. Atkinson, assures us "that new forms of Jassidæ and Membracidæ exist in great profusion in that country."* He published valuable memoirs on Rhynchota.

In 1898 the biological committee of the British Association† decided that, before any zoological term can be recognised, generic or otherwise, it must be, or must have been, published and clearly defined. This decision obviously will reduce the value of many so-called species if known only under what may be designated as "cabinet names."

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* See Journal Asiatic Society of Bengal, Notes on *Indian Rhynchota.* Membracidæ, No. 3, vol. liv. 1885.

† See International Congress at Cambridge Report, p. 288.

Apposite to this, some remarks may be permitted as to the use I have made of the specimens contained in the Natural History Collection in the British Museum at South Kensington.

I understand that the collection of Membracidæ, at the date of this monograph, remains under Mr. Francis Walker's arrangement, except so far as this has been modified by Dr. Butler.

The printed works of these authors are of course to be relied on as authoritative, whilst other undescribed labelled insects must be considered only as cabinet or provisional names.

In the same way, it will be understood that the labels on specimens in the Hope collection at Oxford do not necessarily imply more than the opinion of Professor Westwood or others who labelled such insects. The author of this monograph also only states his belief, that his descriptions conform to continental or other types, in cases where he has not personally examined them.

EXTERNAL ANATOMY.

Before commencing the diagnosis of species it will be well to touch shortly on the general external anatomy of the Membracidæ. It will be the task of the expert microscopist to deal with the internal organs, when opportunities offer for investigating the tissues in the supple conditions of recent life.

The integuments of insects are generally composed of three layers. The outer one is usually smooth, shining, and apparently structureless. With care it may be separated from the others by maceration.

Mostly it is colourless and semi-transparent, but it may be perforated by small holes near the seats of hairs or their follicles.

Beneath this delicate layer or epidermis, there is a soft stratum, which is the location of the brilliant colours seen developed in many Coleoptera and Hemiptera.

The third and thickest layer constitutes the dense corium, in which the bulbs of the hairs are fixed; the sculpturing and apparent punctuation in the surface of many of the Membracidæ are chiefly caused by the thinning down of this tough layer. This punctuation may be well seen when the pronota of genera like Umbonia, Hemiptycha, &c., are viewed by transmitted light under a microscope.

The remarkable spines of these insects have no bulbous origin, but are hollow tubes rising directly from the surfaces, and occur of all shapes and sizes. If broken off, they leave clear apertures in the integument. Being filled with air, they do not impede the movements of the insect, as they would do if solid.

The chitinous parts resist the action of caustic potash solutions, and thus they behave quite differently from the substance of skin, feather and horn.*

Ingenious speculations have arisen as to the elimination of carbon by insects through their respiratory systems. Some have thought that the curious chitinous excrescences of beetles and other insects partake of the nature of excrementitious matter thrown off by the tracheæ. As this matter is assumed commonly after the time of pupation it might be thought that the waste matter accumulates, from the inability of the young imago to throw it off, and that the growths take place from the centres of least resistance, branching into forms like those of Sphongophorus.

Tracheal sacs however are common in many larvæ, where no free carbon is eliminated, and it is difficult to regard the grand framework of the Coleoptera and the Membracidæ as derived from mere waste product.

The exact composition of chitin is yet obscure. After the soft parts of insects have been removed by solution in dilute caustic potash, the remaining part may be readily bleached by a few drops of hydrochloric acid into which some small fragments of potassium chlorate have been thrown. Mounting in Canada balsam then will disclose many details not otherwise visible.

The large pronotal processes of Membracidæ must seriously affect the stability of the insects duing flight, but as all the specimens I have examined show these processes as hollow chambers, the wings have less work to do to keep the insects poised in horizontal positions.

The formation of pattern by stain in the substance of chitin is of great interest, but the question involves too many questions for consideration in this place. Why pattern should be so constant in some genera, and so variable in others, is as yet very obscure.

Patches of white or of colour appear in some Membracidæ to be due to a peculiar felt-like surface resembling fine flannel. This is a growth on the chitinous coat. It appears on the wings of many Cicadidæ and Fulgoridæ, and is quite distinct from the scales on the wings of the Lepidoptera. In the first mentioned families many genera might easily be mistaken for moths or sphinges.

In Centrotus and Pterygia, &c., amongst the Membracidæ, this adherent pile is often scattered in isolated patches with pronounced pore marks, like black spots in white ermine.

The Head.—As a rule the head is not large. It is mostly prone, that is, it is so sloped, that the insect looks downwards on the twigs which support it.

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* See Bataillon on *Chitin*, Bull. Sci. France Belgique, xxv. 1893, p. 18.

The front is triangular in shape, its surface may be smooth, punctured, or pilose. At the cleft base a short proboscis is articulated. The compound eyes are large, usually hemispherical, and studded with minute facets.

The two ocelli are almost always visible as bright spots placed between, or a little below, the line joining the eyes, not on the gulæ or cheeks, as is commonly seen in the Fulgoridæ. When these Membracidæ are viewed as it were in profile, the lower part of the front of the head, being flattened, appears as if the insect was beaked like a bird.

The vertex is rarely visible, as it is more or less covered by the pronotum, or at least it is only separated by a suture, without any neck to connect it with the thorax. The prone, or the more or less perpendicular aspect of the head, with reference to the anterior part of the pronotum, is a good character to consider.

The Antennæ.—These organs are remarkably small and inconspicuous. Whatever function they fulfil in other insects, the sense they develop must be very obtuse in the Membracidæ. The fact that they cannot be found on many specimens in our cabinets does not however prove that in the living insects they may not exist.

The large Cicadidæ show them only as fine bristles, and in the family at present under consideration they are still further degenerated, or are obsolete.

In the species which best show them, they consist of two larger basal joints, articulated to the lower part of the front, and terminated by a long and fine bristle. Plate I, Fig. 6*a*, represents these organs behind the clypeus of *Xerophyllum servillei,* and Plate I, Fig. 7*a*, indicates their position under the ocelli of *Membracis flaveola* and *Umbonia spinosa.*

The Rostrum.—The form of this organ does not essentially differ from that of the Fulgoridæ. It is short, and when at rest, folded between the first and second pairs of legs.

The two joints enclose three setæ or bristles, which are often seen protruded. These piercing organs are shown on Plate A, Fig. 8, which represents the mouth-parts of *Umbonia orozimbo.* The labrum in its position may be seen in Plate I, Fig. 3. *M. fasciata.*

The Eyes and Ocelli.—The compound eyes are large, and usually protuberant. The facets are small, and the hemispherical mass is sometimes sunk in a sort of cup with a rim or edge. The two ocelli are almost always present, and are visible as bright spots between the eyes, at varying distances. Some authors have used their position for the diagnosis of species, but as there is much uncertainty in judging their distances, the character is not used in this memoir of the family. Occasionally the eyes are lenticular or bean-like, or in form somewhat hooked. See Aconophora, Plate A, Fig. 2.

The Thorax.—As is usual in the Homoptera and other insects, this segment is divided into three parts, each with its adjunct of wings or legs, but of these three parts, by far the most remarkable is the region of the pronotum, which often is developed into the most fantastic shapes and excrescences.

The *Pronotum* may be conveniently sub-divided into four, though there are no corresponding sutures to mark them anatomically. These are (1) the *Metopidium*, (2) the *Procephalon*, (3) the *Dorsum*, and (4) the *Posterior process*.

1. *Metopidium.*—Canon Fowler describes this first part as "the declivous part of the pronotum, reaching from the base of the head to the front of the dorsum." It often rises perpendicularly or vertically for a space, and may then develop a long porrect or horizontal horn, as in Polyglypta, or develop into a vertical style, simple or branched, as in Stylocentrus, or it may form a convex curve, joining or running from the dorsal ridge, as in Enchenopa.

2. The *Procephalon* is the portion above this metopidium just described. It is variable in form, and may extend backwards as a horn to the posterior apex, or sometimes it may branch into five or more curious balls or bullæ, as seen in Bocydium.

The *supra-humeral* processes occur above the insertions of the wings, and when seen from the dorsal aspect, are divergent, wide apart, or appear as sharp thorn-like processes of various shapes. They may be broad and flattened at their tips, strongly serrated, carinated, or else rounded. They are not always present, in which case the pronotum is smooth, as in Darnis and Stictopelta.

3. The *Dorsum* comprises the ridge from between the supra-humeral processes (shortly called the *supra-humerals*) to the region of the tail. Sometimes, as in Membracis proper, Ceresa, etc., this dorsal ridge is strongly convex and without any processes; but in other species the dorsal ridge may rise into very grotesque shapes. It may be contorted into almost amorphous masses, as shown in Sphongophorus. In considering a species it will be well to note whether these pronotal processes are truly cephalic or dorsal, and if they prove to belong to the latter, attention may be called to whether the horns or tubercles are single or double in character, smooth or reticulated, clavate, etc.

The dorsal portion of the pronotum may also occur straight and horizontal as in Aconophora, it may be blown up as it were into bulbs as seen in Sphongophorus, or it may be raised into wart-like masses as in Pterygia. In Umbonia and Triquetra the dorsal processes occur in the form of large recurved thorn-like projections, which well represent the prickly parts of shrubs or bushes like our own wild briars. Horny and strong, even red in colour as if bloody, they would suggest the propriety of careful handling, if the insects were ranged in a row on a stem, as on a bramble-stem.

4. The *Posterior process* is continued often to the tips of the tegmina, and it

generally ends in a sharp black point. It may be curved downwards as in Ceresa, or straightly prolonged as in Polyglypta. It may be twisted as in Ophiocentrus, or expanded into a sub-triangular flattened blade, like a ship's rudder, as in Pedalion.

Briefly it might be almost thought that through some convulsive action, these insects had been permanently fixed in catalepsy, and had thus perpetuated their species in the form of a menace to their enemies.

The pronotum, as before noted, is the most highly developed part of the thorax in the Membracidæ, but although so superior in size its uses as thus expanded can only be the subject of conjecture. In Heteronotus the globular masses are very large and filled with air, so most probably they are connected with the respiratory system. They may be looked upon as analogous to the remarkable head-developments of the lantern flies, Laternaria, and the snouts of Pyrops. From such examples as I have examined after maceration in water, I have not been able to detect distinct tracheæ on the inner walls of these hollow balls, though there is an indication of such vessels. The proofs of their presence and import can only come from dissection of recent or living forms. The laminated pronotum of Membracis proper is easily seen to consist of two layers or sheets of chitin, united at their outer edges, and widening below as a cavity to embrace the body above the dorsum of the insect.

The pronotum is almost always pitted by shallow depressions or punctures. These do not seem to be perforations, but they permit the light to pass through them as bright dots when suitably placed on the microscope stage.

As a shell this part of the thorax may be sufficiently large to cover the whole of the tegmina. Generally the head and the eyes are also so wholly covered by it, that they cannot be seen from above.

Much may be learnt by the use of a lens directed towards the front of the insect, in which position numerous outline drawings have been made, to represent the head with the procephalic processes and the supra-humeral horns. The contour of these parts is of much assistance in deciding on the genus and species of an insect.

The whole of the above complex development of the pronotum is practically united into a single piece, which can be easily detached from the head and body of the dry insect, the point of articulation being marked on the mesothorax beneath by a sort of crescentic articulation above the great lobes which operate as attachments for the muscles of the tegmina and wings. The pronotum has often a kind of septum near the posterior end, which completes the enclosing walls of these curious air-chambers.

The *Mesonotum* and the *Metanotum*, so obvious in other insects, are in the Membracidæ concealed, but their presence may be easily shown by removal of the sheath of the pronotum.

The mesonotum then appears to be composed of two shining chitinous lobes or bullæ, which form the attachments internally of the bundles of muscles which move the alary organs. These oval convex protuberances may be seen in *Umbonia spinosa* and *U. orozimbo.* Also in *Membraces tectigera* and *M. alta.*; see Pl. A, Figs. 6, 11, 12.

These processes are quite independent of the pronotal sheath. Above them there is a smaller shining lobe, the significance of which is not so obvious, but it occurs in other insects.

The crescentic process for articulating the pronotum may be seen in Pl. A, Fig. 10, and in profile in Fig. 6. Also the situation of the septum above noted Fig. 13 *d.*

The Scutellum.—This portion of the thorax is very little developed in Membracidæ, though in the allied Jassidæ it is often very visible and obvious.

In the Membracidæ it can rarely be seen, though always present. This obscurity is due to the great development of the pronotum, which entirely covers it, except in the subdivision Centrotidæ, in which case the pronotum is either raised above it by a clear space, or else the pronotum is very short, and but little developed.

The scutellum in insects has by no means the same anatomical importance as the other great divisions of the thorax, for no special organs like wings or legs proceed from it.

It thus proves a valuable help in the identification of species, for it seems to be a rule, that the less specialised a part of an insect is, the more constant it is in form, for it is not necessarily modified by the requirements of organs attached to it, and their adjuncts.

When the pronotum is foliaceous in form, as in Membracis, and thus composed of two distinct layers, the representatives of the mesonotum and the metanotum can be easily seen, and the same may be shown by the careful removal of the large thorn-like sheath of the pronotum in Umbonia. In these cases, viewed from the back, the pronotal attachment occurs as an angular process near the head, and below this three considerable bullæ, or shining, horn-like protuberances mark the attachment of the internal muscles which work the tegmina and wings.

Under the last of these bullæ the scutellum may be found lying above the first segment of the abdomen. In *Umbonia spinosa* this is figured in profile, Plate A, Fig. 6. In *Membracis alta*, Plate A, Fig. 10, it is seen from above.

Though never large, the scutellum is uncovered in the Centrotidæ. Perhaps it has its greatest development in the genera Æthalion and Tolania.

Many Centrotidæ are conspicuously marked with a white triangular patch near the middle of the pronotum, which may or may not represent the scutellum. The spot is covered with a shining felt or velvety, pile-like substance. This structure however appears to belong more to the pronotum than to the scutellum proper, and ought therefore to be included in it.

Although the scutellum is said to be exposed in all Centrotidæ, the tegmina in almost all cases so cover it that it only comes into view when the alar organs are expanded for flight.

The Sternum and its Parts.—The thoracic-parts of Membracidæ show no particular diversity of form, each portion being indicated by the seats of articulation for the legs.

No voice organs similar to those of the true Cicadidæ are present, and the insects appear to be mute as to producing sounds except by a faint buzzing.*

The Tegmina or Elytra.—Difficulties in homologising the wings of the Hemiptera have been long recognised. The neuration of the upper and lower wings is always different.

The tegmina of the Hemiptera Heteroptera are usually quite simple in their venation, but the tegmina of the Homoptera are often very complex, as may be seen in the fine network of Fulgoridæ (lantern flies), which is almost as delicate as that of the Neuroptera.

The tegmina of the Membracidæ follow the general rule in insects, that the upper wing is the largest. Exceptions to this rule however are to be found in the Orthoptera, where there are many specific cases of an entire absence of elytra, in which event the lower wings become very large and efficient.

Wing neuration presents great difficulties where we find variation not only in the species of the same genus but also in the different sexes. There are peculiar obstacles to the study of the wings of Membracidæ. The pronotum is so large that in some cases it quite encloses them, and they can only be unfolded, in dead specimens, by the removal of this part of the thorax. The pronotum, moreover, is not cleft as we see in most Coleoptera, but consists of one hard piece, soldered to the shoulders, and it is only then possible for the insect to open its wings after a depression of the abdomen. Characteristic notches are then provided in the shoulder edges for the insertion of the wings, and so as to allow them to have free play.

Dr. Léon Fairmaire, Dr. Goding, and Canon Fowler have given detailed notes and outlines of neuration in many species of Membracidæ, and I have gladly availed myself of their help.

A review of the outlines I give to represent the neuration of the wings and tegmina will show their very diverse characters. Scudder and others have laid much stress on the importance of these veins for classification in the families of insects. Others like Brauer, consider the alary organs to be of secondary importance.

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* The Cicadidæ in Surinam are called Schaarslijpers or shear-grinders, doubtless from the noise of their chirping. No noise, however, has yet been detected from the Membracidæ, though these insects are allied to the Fulgoridæ and Cicadidæ.

In this monograph I have employed the alary characters more as a help in diagnosis, than made any attempt to found generic distinctions upon them.

In some families of Homoptera the comparative simplicity of wing frame-work is of great value, and it can be relied on, as in Aphis and Coccus. In Cicada, and also in Fulgora, Jassus and Membracis, the neuration, taken alone, will be found insufficient for sharp separation into genera.

The Radial Nervures.—The membranous part of the alary system is divided into two portions, separated by a suture which may or may not be strongly marked. The upper part or corium is outwardly bounded by the costal nervure, which with the cubitus below forms the chief frame-work on which the wing is built. Insensibly the costa unites with the apical nervure, bordered by the delicate membranous fold forming the limbus in many, but not in all species.

For convenience of nomenclature I count four chief radial nervures, which may proceed straight to the apex of the tegmen. These may be forked, to inclose additional areas or cellules of the tegmen.

The first radial is the costal. Those following are named the second or cubital, the third and fourth radials. These are succeeded by the sutural fold.

One radial may be connected with another by short transverse nervures, but these are not considered as furcations, for they do not directly run to the margin.

The lower margin forms the claval suture or bend, which enables the insect to fold up this part of the tegmen in small compass under the pronotum. It is not always easy to trace this sutural fold in the expanded wing, but it is often shown by a kind of notch in the apical membranes.

A radial may be twice furcated, which of course will increase the number of the alar areas enclosed.

The Transverse Nervures.—These are short connections between the longitudinal ribs of the wings. Their variable number, according to the genus or even the species of the insect, renders a satisfactory nomenclature difficult. These short nervures moreover are not always constant in a series, and sometimes they abnormally appear double. On this account, and the tendency shown in some genera of Membracidæ to develop these transverse nervures in curves, rather than in straight lines, less reliance can be given to the wing-neuration for generic diagnosis than is available to most other insects.

Examples of such difficulties may be instanced in Ceresa, Cyphonia, and Bolbonota.

It may here be noted that in the Membracidæ the wings, when folded and at rest, are usually carried pent-wise as in Aphides. Thus the costa is seen below the lower edge of the pronotum. Often the greater part of the flying apparatus of the insect is covered up. In Darnis and Stictopelta the costal parts are the only portions visible.

The Membranous Areas or Cellules.—The substance of the tegmina is very varied in character. In some genera it is dense and horny, in others corrugated, striated, or punctured wholly, or in part. Other species show them clear, hyaline, or fumose. A few like Lycoderes, have developed bright colours and banded marks. The tegmina are protections to the more delicate true wings folded under them.

Generally the tegmina are terminated at the apical ends by a broad border rather thinner than the rest of the substance, and finely crumpled or corrugated. This is the limbus. It is not always developed, though its presence is the rule.

The Apical Areas.—The number of these cellules has been used by several authors as a help to the generic distinctions, but it is not always clear what designates an apical area. I have figured a tegmen of *Hoplophora pertusa* as being a somewhat common and large species, the lettering of which diagrammatically will show what I mean, when the number of cells is noted in the diagnosis of species.

The apical areas are all bounded by the limbus, or else by a peripheral nervure, and by one or more portions of the radial nervures. The cubital area, F, called by some the embolium, may be coriaceous. It is bounded by the cubitus and the costa, but often it is inconspicuous. The other areas, numbered 1, 2, 3, 4, 5 (5 being present only in some genera), are contiguous, and succeed each other till the claval or anal suture is reached. The inner areas sometimes are complete to the base of the tegmen, and are the 1st, 2nd, and 3rd discoidals figured as A, B, C. There may be a supplementary cellule which is subcubital. If there be a basal area D, in the tegmen it will be situated close to the union of the radial nervures, but there is confusion in the nomenclature. I may cite Fairmaire's conclusion that Polyglypta has three basal cellules, whilst Fowler gives an outline of the tegmen of Polyglypta, with what I consider to be one large basal area with four apical and one discoidal cellule.

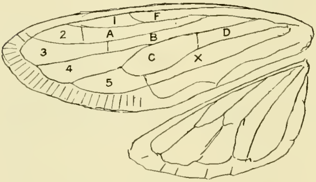

Fig. 1.

In Hoplophora pertusa I count only one basal area.

In Darnis and Membracis there is no basal cellule.

Except for specific purposes, the plan of wing-neuration breaks down. Even the species of a genus may here vary one with another.

When practicable I have given outlines of venation from the insects described, but I append a sketch plan to show what is meant by the nomenclature used in the diagnosis.

The cubitus may be forked, and this shorter branch may be forked again, as seen in Membracis. The question is, should the area enclosed by the first furcation, bounded by the fine apical nervure, be counted as a subcubital area, or the first apical area? I prefer to call it apical, and thus Membracis will have five and not four apicals.

The area marked **X** I call the sutural area.

Where there is no subcubital the first apical would touch the cubitus, but it is difficult to form a rule for all genera.

The Wings.—A few words will suffice as to the neuration of these more simple organs, which are smaller than the tegmina, and are folded behind them. Usually, as in Umbonia, they have broad corrugated outer margins of delicate membrane. The base gives off from four to five radials, enclosing petiolate areas, with angular cross-veins connecting the first with the second, and the second with the third main veins.

In this manner four, five, or more apicals, two discoidals, and three anal cellules may be formed. The variations are numerous, as shown in different species. The subdivisions of the membrane are not easy to describe in words, but some cellules may be seen drawn on the plates to follow in the diagnoses.

The Abdomen.—In Hemiptera, and, still more, in Homoptera, there is difficulty in determining the exact number of the abdominal somites, or rings. This in great part is due, at least amongst the Homoptera, to the whole or partial overlapping of the mesothorax with its scutellum and the smaller metathorax below it. Again, it is not yet decided how many segments are theoretically comprised in the development of the genital apparatus of the sexes.

The female of *Membracis mexicana* has clearly nine segments, the last of which constitutes the pygofer of Fieber and other authors. In Aconophora ten may be counted, whilst in Umbonia, perhaps, there are eleven somites.

The stomata or spiracles are ranged in a row on each side of the abdomen, but they are not easily seen, unless the insect is bleached and mounted in Canada balsam. They are not protected by pleural or lateral folds as in some other Homoptera like Aphides, which often show them guarded by the connexivum.

The stomata in Membracis are six in number, but probably the normal abdominal number should be seven, in addition to three others on the thoracic portions.

As a rule the abdominal parts of the males are flatter and smaller than those of the females. The females are robust and deeply ringed, the last segments being often the broadest, and developing the genital valves from the under side.

The Membracidæ are not characterised by the noxious odours common to many bugs. The orifices to their supposed stink glands have been confused with the true stomata, with which they have no connection. The demon-like forms of some Centrotidæ might be thought to be sufficiently deterrent, without the adjunct of a vile odour.

The Genitalia.—It has been pointed out that what are called secondary characters (that is, those less important to an animal's economy) are those the least likely to undergo change when the animal is persistently forced into new conditions of life. They keep their functions, but they may be modified in form. What may be called the plastic organs are those obviously the most liable to be affected, and thus it happens that they do not readily lend themselves to generic classifications.

So it is that wing-neuration often breaks down where most it is wanted, and sexual characters which might seem well suited for separating genera, fail us from their wonderful adaptability to altered conditions. An insect may be winged or apterous without losing otherwise its general distinctions; or this character may affect only one sex.

This is true also of the external sexual organs of insects. Modifications are produced which do not impair the primary functions. Ovipositors, stings, and piercing saws in the females may be answered by elaborate claspers, styles, and long intromittent appendages in the males.

The diversity of form and the aptitude for variation appear in these organs to be an embarrassment rather than an assistance in classification. Authors have more or less successfully described and figured the sex-organs, but up to the present time much is left to be done, before genera can be founded, or based on the singular forms assumed by these parts in species.

The external genitalia of the Membracidæ do not however greatly differ in form from the allied Jassidæ and Cercopidæ, but perhaps they are less complex.

The female parts are represented by six pieces—*viz.*, two valves, two inner rasps or sheaths, and two sword-like blades, but slightly serrated, and without any marked ovipositor. We may infer from what is known of Tenthredo that there is some alternating action in these saws, and that grooves are cut in bark or rind into which the female inserts her eggs. The field naturalist here might help us in showing this part of the life economy of these insects.*

The males in many species have the lower parts of the ninth abdominal segment produced into a pointed process, whilst the upper part develops two lobes, which fall one on each side, as in most other males of Homoptera.

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* An interesting account of the habits and the oviposition of *Ceresa bubalus*, by C. L. Marfatt, may be found in No. 1, vol. vii. of "Insect Life," Washington, 1894. The subject will be discussed when that species is described later on in this monograph.

Besides these parts, there are often styles superadded and used for tentative or retaining hooks. (Pl. B, Figs. 1 to 6.)

The females are furnished with more or less developed lateral valves, which enclose the above-mentioned cutting blades, and these most plainly distinguish the sex of the insect.

A good deal of interest is connected with the peculiar attitudes taken by insects during their courtship. The antics of spiders and ants have been well described, but no biologist has yet told us how the apparently inconvenient pronotal horns and thorns of the Membracidæ (mostly confined to the male sex) are arranged during the union of the sexes. In insects, as a general rule, the male during nuptial flight is carried by the female. There are, however, examples in which the contrary action obtains, and such feats may prove to be impossible in cases where the thorny backs and the branching serrated processes of both male and female must make the position untenable. The clasping apparatus of the last ventral ring leads to the supposition that the smaller but more brilliant partner is trailed ignominiously in the rear. Subsequently the female looks out for a suitable nidus for her eggs, which appears to be an absorbing occupation.

The male organs of the Centrotidæ are somewhat more complex and modified than those of the Membracidæ.

I append (Plate B) some details typified by *Centrotus leucaspis* of India. Other details will be found on the different plates which represent other perfect insects.

In Centrotus and other genera the penultimate somite develops a hinged horny sheath, which contains one (or two?) delicate styles which may act as irritators. The ultimate somite furnishes also two hatchet-shaped ciliated claspers, the hooks of which point upwards. Within the ring is the penis (not here shown, but represented in Stictopelta.)

Above the ring, and in a line with the dorsum, in some species a small two-jointed caudal process appears, such as is often found in Tettigonia, Typhlocyba, and amongst the Jassidæ, and it is seen also in the Cercopidæ.

In *Stictopelta bipunctata* this tail or caudal process assumes the form of a rounded knob. The lower sheath is double-jointed, the claspers broad and hooked, the penis ciliated and exserted, with an additional style below it. (Pl. A, Fig. 15.)

The genitalia of the Homoptera are so aberrant from any known accepted type, that at present they can only be formulated for specific purposes. There is here much to be done, but the subject is not a little intricate.

The number of ova capable of extrusion must be great, if we may gather from the specimen of *Umbonia orozimbo* I have dissected, after maceration in water. From the abdomen three or four dozen eggs were extracted, and the limit of the ovaries was not then reached.

In default of a more exact examination being possible, we may infer that if a specimen of one of the Membracidæ shows the presence of ventral valvular scales below the abdomen, it is of the female sex.

The Legs.—As in other insects, we have the three principal divisions of femur, tibia, and tarsus; the femur being separated from the thorax by the coxa and the trochanter.

Starting from the body of the insect, the first coxæ are joined to the prothorax (prosternum); the second to the mesothorax; and the third pair of coxæ to the metathorax. The first pair of legs is attached so near to the head that the knees of the femora sometimes project before it, and might suggest that the legs were prehensile in function.

The first coxæ are sometimes long and rather broad, as may be seen in *Membracis mexicana*, &c.

The femora are stout and not remarkable as to form, except in the curious genus Xerophyllum, when we see them expanded into notched and foliated plates, under which the tibiæ are doubled back and concealed, whilst the insects are squatting and at rest.

The tibiæ are articulated to the femora by a more or less conspicuous joint. These tibiæ take various forms and they are then characteristic of genera. In Membracis the first and second pairs are laterally and broadly flattened into a spatulate or foliated shape. These plates are developed on the front surfaces of the tibiæ, they are carinated at their margins, and their surfaces are often pilose, like the pollen-collecting baskets of the hind legs of the honey-bee.

It is to be remarked that these spatulate tibiæ are seen in a modified form in some of the Centrotidæ. Such a fact seems to reduce the value of spatulate tibiæ when used for generic purposes.

In some species the extremities have small crowns of sharp spurs developed at the insertions of the tarsal joints. The hind tibiæ are usually the longest; sometimes they are finely serrated on one edge, doubtless to assist the insect in its leaping flights. Sometimes prismatic in form, they have their sides channelled or excavated.

Examples of foliated tibiæ may be seen in other insects besides the Membracidæ. A remarkable instance may be given in the South American genus Diacton (Coreidæ) and another in the Australian heteropterous insect *Ptilocnemus sidnicus*.

The Tarsi.—The character dependent on the number of these small joints of the feet of insects may seem to be trivial, but they exemplify the fact, already noted as to wing neuration, that comparatively unimportant organs undergo little change from their surroundings, and they may thus furnish good, steady points for classificatory purposes.

Three tarsal joints are most commonly found in the Homoptera, but sometimes the first and second joints are so united that only two can be seen, even with a microscope.

The division into monomerous, dimerous and trimerous groups seems nevertheless to follow very natural lines, and we accept the correctness of these divisions both morphologically and biologically, in the families of Homoptera, such as Cicadidæ, Aphididæ and Coccidæ, &c.

Unvarying rules cannot be framed to meet all cases in our classifications. The exceptions puzzle us.

Insects with different numbers of tarsi on the fore and the hind legs are familiar amongst beetles and other insects. The division Heteromera amongst the Coleoptera is significant of incompleteness in our schemes.

It is not difficult to state the normal number of digits in man and birds, but in microscopic insects the number of foot-joints often is not so obvious.

The third tarsal joint is usually the longest, but the length varies with the genus, and there is much difference in length as we compare separate pairs of legs. As a generalisation, it may be taken that if there be a divergence in the number of tarsal joints of the Membracidæ, the hind pair of legs in Membracis proper is trimerous, whilst the first and second pairs are dimerous or trimerous. The tarsi of the hind legs are often very weak and small. The trimerous tarsi are well seen in Umbonia and in Centrotus and its allies, in all their legs.

The second tarsal joint is the smallest, and forms a hollow conical articulation, which is united to the first joint by its apex, and to the third by its base. An elastic membrane connects these joints, and gives free motion to the whole foot.

The third joint ends with two hooked claws. In some species these claws are protected between two rounded pads, and then the foot seems to be terminated by pulvilli instead of claws. Where necessary, details of the legs of species will be found on the plates representing the entire insects.

Before concluding this sketch of the external anatomy of the imaginal forms of Membracidæ, we may call to remembrance the fact, that no system based alone on morphology can be regarded as perfect.

Mr. W. F. Kirby remarks to the author that "Nature is believed to have grown up into the form in which we now see it, from infinitesimal beginnings, by the effect of gradual changes acting and reacting on each other in the course of countless ages."

We are apt to ignore the fact that affinities often exist between groups and species, which in our necessary schemes we separate widely or ignore.

The Immature Forms of Membracidæ.—Where so little has been written about the perfect insect, we need not consider it strange, that the early stages have received little attention.

The metamorphosis of Membracidæ is of the character styled incomplete, that is the pupal or nymph stage is in a measure locomotive.

Probably there is a short season of rest before the final exuviation takes place. The process and time taken in the growth of the pronotum will prove an interesting subject for future observation.

Few things are more difficult to realise than the fact, that some insects undergo even twenty moultings in five or six days.* Time is relative. We can have no adequate conception of the multitude of phenomema concerned in bringing about a simple chemical change in a decomposition. Biological changes must be still more complex.

The Pupa.—Histolysis consists in the apparent solution of previously existing organs, and formation of a kind of magma, out of which, through Histogenesis, new organs are built up. These portions of former existing tissues are believed to act as centres, from which new conditions arise. Members of the body and points of sensation are altered, perhaps in shape, in position, and even modified in function.

Viallanes looks on this breaking-up of parts as a kind of inflammation, wherein only the pristine germs or imaginal discs survive destruction. But however this may prove to be true, a reconstruction of parts markedly takes place during the period of pupation, and more particularly in those cases where metamorphosis is said to be complete.

But though the pupæ of Membracidæ are active, and move from place to place at will, the two processes of solution and reconstruction are going on simultaneously.

During the years between 1783 and 1794, H. J. Scheller prepared drawings and descriptions of three species of Membracidæ, which he observed living on certain trees or low shrubs in Surinam. The names of these shrubs he unfortunately omits to give us, but as observations on the spot, in connection with life-history, are important, I make no apology for giving through the kindness of a friend, the substance of the Dutch paper read in 1868 before the Ent. Soc. of the Netherlands, which treats of the metamorphoses of these insects.

It may be said that up to this date nothing definite of these larval conditions has been published, and even now all trustworthy contributions will be acceptable, though they be meagre.†

I venture therefore to reproduce enlarged drawings of these metamorphic forms, since the original life-sized figures are too small for general use.

Like the editors of the above-named paper, I put forward no information as original in what follows.

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* See Burmeister; D. Sharp on *Insecta*, Camb. Univ. Press, part i. p. 166.

† See footnote, p. 18.

Membracis foliata, *M. lunata*, and *Enchenopa lanceolata*, appear, as to the first and second species, to congregate either "in thousands or by twenties or more on the upper boughs of trees." In a general way, night seems to be the usual time for disclosure from the egg, when they appear white, and soft in consistence, but speedily (within an hour) they harden.

They hatch in Surinam early in January or February, and are covered with a white powder, which is easily rubbed off in the more mature insects.

In all the above cases the larvæ have every ring of the abdomen, except the last, furnished with a pair of reddish bristle-like processes, which, afterwards, in the pupæ, start from black spots. Scheller counted seven double rows in these larvæ, representing the abdominal rings.

The pupæ are drawn with prominent wing-cases, and these are also shown in the figures of the larvæ; but doubts may be expressed here as to the accuracy of the draughtsman employed by Scheller in thus showing them.

The descriptions of the imagos are virtually those given of specimens in the Rijks' museum at Amsterdam.

These three species of Membracidæ are described as being very active in their movements, both springing and flying from their bushes, on the approach of an observer. This active habit is also testified by Dr. Micklejohn to the present author who often observed the flight of *Bocydium clavatum* in Brazil.

Though this insect is curiously weighted on the head by large balls, he did not notice that its progress through the air was clumsy, or even confined to a mere floating suspension.

The larvæ and nymphs are stationary in habit, or they move slowly from place to place.

When the complete insect emerges, it leaves a perfectly formed slough behind it which Scheller describes in one of his figures (c.), "as the skin out of which 'the full grown jumper' has crept."*

When the winged insects emerge from their exuviæ they appear almost colourless, but the brown and black banding within three days appears, and the horny pronotal crest consolidates rapidly.

A few ants were found in attendance on the larvæ of *Enchenopa lanceolata*, and these ants were thought to be in quest of sweet drops secreted from pores—a juice similar to the honeydew of Aphides, and shed by some Cercopidæ and Psyllidæ.

Nymph.—A distinction should be made between the pupa which strictly should be quiescent, and the locomotive "stadium" or stage of development, designated by the term Nymph. This last condition is represented in the Cicadidæ, Fulgoridæ, and

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* See *Tijdschrift voor Entom. di Nederlandsche*, 1868–1869, pp. 217–220.

Membracidæ. The slough or skin which is vacated by the imago sometimes has processes which cannot be seen in either the imago or the larval conditions.

As yet the number of stadia indicated by the moults of Membracidæ has not been determined; indeed there are only a few insects in which the number has been definitely ascertained.

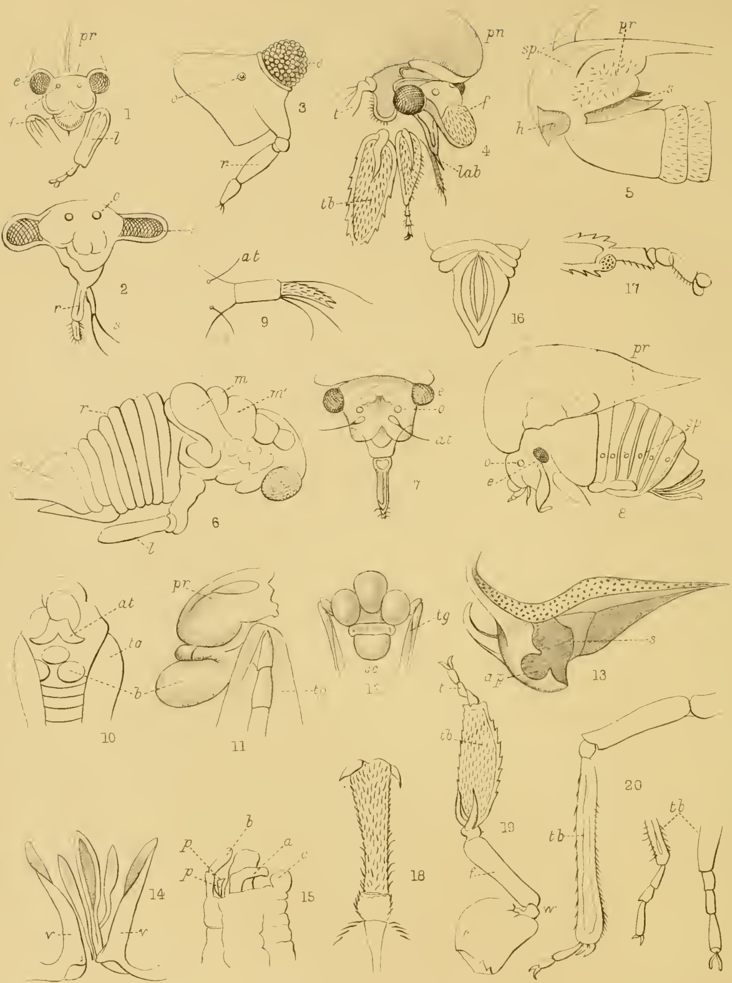
The Larva.—This stage in development appears to vary much in form according to the species. The larva of *Membracis continua* is furnished on each abdominal segment, to the number of six, with a distinct laminar plate, finely spinose at the edges. These leaves are ranged in a semi-circle like the points of a crown. The plates on the head and region of the pronotum are the most developed. The insect I figure was labelled by Westwood, and is ochreous brown in colour. It forms part of the Hope Collection at Oxford.

The larva of *Membracis expansa* I also draw (Pl. I., Fig. 4*a*). It is grouped with the perfect insects in the national collection. Robust, inflated, and of a pale greenish grey, plentifully covered with white tomentose matter, its general appearance recalls that of the larva of one of the Cercopidæ.

The corresponding nymph or pupa shows two kidney-shaped lobes over the head, which seem to indicate the two laminæ which afterwards unite to form the crest of the imago. The rings corresponding to the pro- and mesonotum are clearly seen. Behind each of these six segments a pair of long curly bristles or spines is emitted. At the sides, the wing-cases show the rudiments of the future tegmina.

These examples are in accordance with the figures and descriptions given by Scheller before alluded to, representing the nymphs of *Membracis lunata, M. foliata,* and *Enchenopa lanceolata.*

The Centrotidæ also have nymphs of uncouth form. Strong spines appear on the backs, which only partly foreshadow the thorny processes of the imagos.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West, Newman imp.

DESCRIPTION OF PLATE A.

Fig. 1. The head of *Enchenopa cruentata*—(*e*) The eye; (*o*) ocellus; frons and (*f*) clypeus below; (*l*) spatulose legs with the tarsus; (*pr*) fore-edge of the pronotum.

Fig. 2. Front view of the head of *Aconophora nigrissima*—(*e*) The elongated eye, covered by the transparent cornea; (*o*) ocellus; (*r*) rostral two-jointed sheath, with the proboscis below, furnished with bristles (*s*) or extruded setæ.

Fig. 3. Profile view of the head of *Membracis mexicana*—(*e*) Prominent eye set in its socket; (*o*) ocellus; (*r*) rostral sheath.

Fig. 4. Head and fore parts of *Membracis fasciata*—(*lab*) Labrum above the rostral sheath; (*f*) clypeus covered with fine hairs. The frons above shows the two ocelli between the true eyes; (*t*) insertions of the tegmina or upper wings; (*tb*) first and second tibiæ with their tarsal joints, the first two pairs are spatulose, the foliacious plate by the front view, conceals only half the tibia; (*pr*) the front part of the pronotum overhangs the head.

Fig. 5. Part of the pronotum and body of *Centrotus leucaspis*—(*h*) shows the aperture in the pronotum through which the head protrudes; (*pr*) pronotum; (*sp*) the supra-humeral processes or horns. Sometimes these excrescenses are large and branching, but in some species they are wholly absent; (*s*) scutellum seen in part below the pronotum; often this part of the thorax is quite hidden.

Fig. 6. The body of *Umbonia spinosa* divested of the whole sheath of the pronotum, thus showing (*m*) the bullæ of the meso- and the meta-notum which are concealed by the pronotum. It will be seen that the insect with its legs and wings is almost complete without the extraordinary adjunct of the pronotum; (*r*) the somites or rings of the abdomen. The representative of the scutellum may be seen above the somites of the abdomen; (*p*) the last abdominal ring of the female, with the pygofer which carries the genital valves; (*l*) femur of the hind leg.

Fig 7. Head of *Umbonia spinosa*, by front view—(*at*) Antennæ placed just below the ocelli (*o*). The stout rostral sheath with bristles at the tip; (*e*) the compound eye.

Fig. 8. An example of *Membracis mexicana* which has been bleached and made transparent by Canada balsam. It thus shows the meso- and meta-notum through the (*pr*) pronotum; (*sp*) the spiracles ranged on the sides of the abdominal rings. The genital plate with its saws is seen below.

Fig. 9. Rostral sheath of *Umbonia orozimbo*, showing the three long setæ proceeding from it. The action of these long bristles probably consists in lacerating the

soft tissues of the bark of vegetables, and thus a larger flow of sap to the parts pierced is produced. (*at*) Antennæ of the same.

Fig. 10. Dorsal view of upper half of *Membracis alta* with the pronotum removed —(*at*) Process of attachment for the pronotum; (*tg*) tegmina; (*b*) bullæ or tubercles of the meso- and the meta-notum. The abdominal rings are seen below.

Fig. 11. Similar parts seen in profile of *Umbonia orozimbo*—(*pr*) Pronotal attachment; (*b*) large meta-notal tubercle; (*tg*) tegmen.

Fig. 12. Similar parts of *Umbonia orozimbo*—(*sc*) The scutellum. As the presence of this part of the notum is used in the grouping and classification of the genera of Membracidæ, its indications below the pronotum are important for study.

Fig. 13. The pronotum, in its entirety, removed from the body of *Hemiptycha punctata* —The upper part is studded with clear transparent dots. The large suprahumeral horns are hollow; (*ap*) the aperture which embraces what may be considered as the neck, just behind the head of the insect; (*s*) a septum or fine horny division which divides the posterior space and encloses the abdomen and part of the wings.

Fig. 14. Part of the valves of the female of *Umbonia spinosa* as seen expanded under gentle pressure—(*v*) The valves or scales enveloping the central rasp (?) and the two cutting plates or saws (?) which here do not appear to be serrated.

Fig. 15. The male organs of *Stictopelta bipunctata*—(*a*) One of the hooked styles or claspers; (*b*) the basal plate composed of two joints; (*c*) The caudal process; (*p*) the penis.

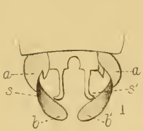
Fig. 16. The last abdominal ring of the female of *Umbonia spinosa* seen from underneath. The parts shown in Fig. 14 may be dissected out of the cleft situate within the outer valves. They have not been shown in this outline.

Fig. 17. Part of the front leg of *Membracis mexicana*, showing the complex form of the tarsus. The foot ends with two flaps which enclose the minute claws. There is a gland at the extremity of the tibia, the significance of which is not obvious.

Fig. 18. The last tarsal joints of the middle leg of *Membracis mexicana.* They are very pilose, and difficult to separate into their true articulations. The two claws here are obvious.

Fig. 19. The complete middle leg of *Membracis flaveola*—(*c*) The flattened coxa; (*tr*) trochanter; (*f*) femur; (*tb*) tibia and (*t*) tarsus. The flattened part is an expansion of the sides of the tibia.

Fig. 20. The first, second and third legs of *Hemiptycha punctata*, showing under the same amplification the tarsal joints, which increase in length and development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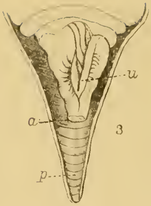
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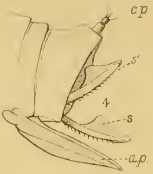
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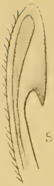
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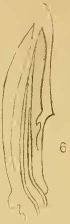
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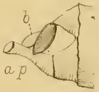
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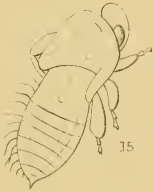
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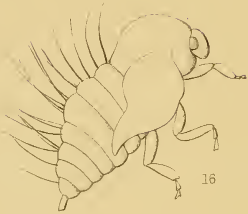
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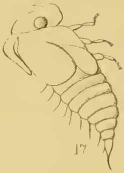
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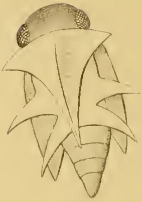
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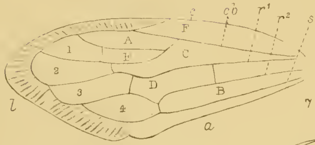
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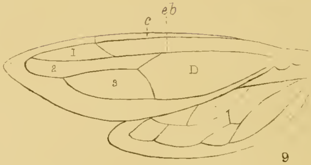
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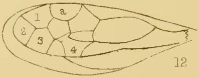
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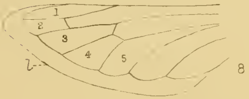
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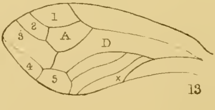
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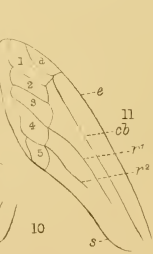
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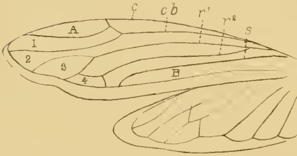
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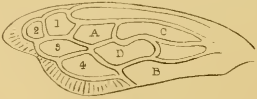
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from the first to the third pairs. The hind tibiæ are long, channelled, and show minute spurs at their extremities.

DESCRIPTION OF PLATE B.

Fig. 1. Diagrammatic view of the male parts of a Hemipterous insect, the general form and character of which may be traced in the genitalia of the Membracidæ. Variations however are very common—(*aa*) The lateral processes; (*bb*) infra-lateral plates; (*ss*) styles or claspers.

Fig. 2. Profile but inverted diagrammatic view of the male parts—(*ap*) Anal aperture at the end of the process; (*b*) infra-lateral plates. The styles are retracted into the pygofer.

Fig. 3. Underside of the pronotum of the female of *Umbonia spinosa*—(*v*) The vulva at the extremity of the abdomen, which is within the cavity and covered by the pronotum; (*a*) the anal opening; (*p*) the posterior apex of the pronotum.

Fig. 4. The male sexual organs of *Centrotus leucaspis*—(*cp*) small caudal process composed of two joints, situated at the upper edge of the last abdominal ring; (*ss*) the hatchet-shaped styles with finely serrated backs; (*t*) the theca or sheath, called post-penis by Fieber.

Fig. 5. One of the same styles more magnified.

Fig. 6. The theca more magnified, showing ducts in the concave part, probably connected with the penis.

Fig. 7. Tegmen of *Membracis flaveola*, showing (*c*) the costal nervure or first radial nervure; (*cb*) the cubitus or second radial nervure; (*r*3) the third radial; (*r*4) the fourth radial; (*s*) the sutural nervure; (1) (2) (3) (4) the apical cells; (*l*) the limbus; (C) (D) (E) discoidal areas; (A) subcubital; (B) supra-marginal area; (F) costal area.

Fig. 8. Wing of *Membracis flaveola*—1, 2, 3, 4, 5, apical areas; (*l*) limbus.

Fig. 9. Tegmen and wing of *Polyglypta*—(D) Basal area; although in other species this area might be called discoidal. The apical cells are difficult strictly to decide as to their homologues with other genera. They are here marked 1, 2, 3.

Fig. 10. Tegmen and wing of *Umbonia spinosa*—The lettering of the figure refers to similar nervures and areas as are marked in Figure 7 of this plate.

Fig. 11. Tegmen of *Heteronotus*—(A) Subcubital area; 1 to 5, apical area; (*s*) suture.

Fig. 12. Tegmen of *Cyphonia*—(A) Subcubital, with the apical areas following in order; an indistinct vein divides some of the areas, but it seems to be supernumerary.

Fig. 13. Tegmen of *Lycoderes*—(A) Subcubital; (D) discoidal: (B) supra-marginal area.

Fig. 14. Tegmen of *Ceresa*—The neuration here is very broad, and encroaches on the areal membrane. The correct nomenclature here may be subject to opinion. The limbus is wide, crinkled or indented.

Fig. 15. Pupa of *Membracis lunata*—Enlarged from the figure given by Dr. H. J. Scheller, though described by him in his memoir as a larva.

Fig. 16. Pupa of *Membracis foliata*, copied from the same memoir—The long spines or bristles on the abdominal rings entirely disappear from the imago or perfect insect.

Fig. 17. The pupa of *Enchenopa lanceolata*, also furnished with bristles. The process at the back of the head here projects backwards. The sheaths of both the growing tegmen and the wing are prominent. All these three figures are adapted from those of Dr. H. J. Scheller.

Fig. 18. Pupa of a small *Hoplophora* (species unknown), but possibly allied to *Hoplophora sanguinosa*.

MEMBRACIDÆ.

Sub-family: *MEMBRACINÆ.*

Cicada foliata of Linnæus, afterwards *Membracis foliata* of Fabrinus is the general type of these insects, but this species has not always been placed at the head of the sub-family. I prefer, however, to take the genus Membracis in priority, as Canon Fowler and some others have done, excepting only the genus *Xerophyllum,* which as being as far as is known apterous, and showing peculiar characteristics in the femora and tarsi, appear to be sufficient reasons to justify this order.

Genus: XEROPHYLLUM,* Fairm.

Dr. M. Léon Fairmaire commences his valuable "Revue de la Tribu des Membracides" † with the genus *Xerophyllum,* of which he gives outline figures. He does not appear to have known more than one species, and apparently at that time to have seen only one example.

One great characteristic is that the genus appears to be apterous, and that the singular mimicing resemblance to dry vegetation is carried out in the leaf-like expansion of the legs and part of the face.

M. Fairmaire heads his synopsis with this genus, and then takes in order Membracis, which now forms the type raised by Linnæus.

Prof. Westwood, however, pointed out in 1839 its nearer approach to the Order Orthoptera, in which modern entomologists now place the genus.

The foliaceous, rotund, and elevated pronotum which covers the body and elytra, if they be present, suggest the genus Membracis; but on the other hand the leaf-like expansions of the femora, the form of the face, and the absence of a proboscis would show its truer position to be where Prof. Bolivar places it—viz., amongst the Cladonotæ, a section of the Tettigidæ (not of the Cicadinæ).

On account of the above noted affinities with the Membracidæ, I figure for comparison three species of Xerophyllum, which have come under my own observation.

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* Xerophyllum, *i.e.*, dry leaf.

† "Annales de la Société Entomologique de France," Ser. 2, iv. p. 235 *et seq.:* Plates 3 to 7 (1846).

All the species hitherto known have their habitats in the Old World. As specimens are rare, and seldom to be seen in collections, small apology will be needed for their appearance in my first plate—a position originally indicated by Dr. Fairmaire in his treatise and classification.

His description is shortly, "Omnino nigro fulvum, nigroque punctatum."

Prof.* Bolivar gives "Femoribus anticis compressis vix duplo longioribus quam latioribus. Pronoto magno, valde compresso, foliaceo radiatim venoso. Elytris oblongis vel nullis, alis nullis."

He describes four species—viz.: *X. fuscum* (Bolivar), Sierra-Leone; *X. platycoryx* (Westwood), Afrique; *X. simile* (Bolivar), Angola; *X. servillei* (Fairmaire), Afrique.

Prof. Bolivar asks, in common with other naturalists, what can be the significance of these greatly developed pronota, formed of membranaceous plates and furnished with numerous veins and recurrent nervures which give the appearance of vegetable leaves.

Probably the insects live amongst the *débris* of decaying wood and dry foliage, and they assume their brown tobacco-like colours for concealment, and for escape from their insect enemies.

The forms of the pronota in the Membracidæ are also interestingly reproduced in some of the Acridians, and Prof. Bolivar figures examples of: *Xerophyllum simile*, *Cladonotus humbertianus*, with its curious dorsal horn, and *Misythus laminatus*, all recalling the forms of certain Membracidæ.

XEROPHYLLUM SERVILLEI.

(Plate I. figs. 1 to 1e.)

Xerophyllum servillei, Fairm., Ann. de la Société de France, 1845–1846, plate iv. figs. 10, 11, 12.
X. servillei, Bolivar, Essay sur les Acridiens.

Head small. Frons foliaceous. Carinated between the eyes and bifurcated below. Antennæ obvious. Ocelli below, seated in pits. Prothorax semi-circular in outline, overhanging the head, foliaceous, more or less flattened, much reticulated, and veined like a brown and dry leaf.

Abdomen pointed and ringed. Legs remarkable from the femora and the fore-tibiæ being both notched and foliated. The middle and second tibiæ folded and concealed under the thighs.

Tarsi very weak in the fore legs, long and curiously spurred on the hind legs.

Tegmina mere scales. Wings obsolete.

Size, 13 × 8 mm.

Habitat.—Old Calabar. Figured from own cabinet.

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* Ign. Bolivar, Essai sur les Acridiens, Ann. de la Soc. Ent. Belgique. Gand (1887).

XEROPHYLLUM CORTICES, n.s.

(Plate I. fig. 2.)

Much larger than *X. servillei.* The pronotum more arcuate, with a browner outer edge, and on the rim furnished with minute spines. Hind-femora large, with small reddish tarsi.

Size, 19 × 11 mm.

Habitat.—Two specimens from Rio Nigro, Ogruga, West Africa, 6° 5′ lat. N. 6° 42′ long. E.

XEROPHYLLUM MINOR, n.s.

(Plate I. fig. 3.)

Much smaller than *X. servillei.* Colour almost all concolourous umber brown. Pronotum with the dorsal edge provided with a distinct carina. Lower margin sinuous. Fore part of the pronotum redder, surface rough and corrugated and without punctures. Femora foliated and notched, tibiæ hirsute. Eyes large and prominent.

Size, 7 × 5 mm.

Habitat.—Rio Nigro, Ogruga, West Africa, 6° 5′ N., 6° 42′ E.

GENUS: MEMBRACIS, Fab.

Eyes prominent. Ocelli two, and placed in a line which passes through the eyes. Pronotum membranaceous, tectiform, the dorsal ridge cycloidal and overhanging the head. Tegmina free, with two or three discoidal areas. Tibiæ, at least the fore ones, spatulate.

Larvæ saltatorial, feeding on various plants (Ketmia braziliensis). According to Merian they disclose the imagos at Surinam in March.

MEMBRACIS FLAVEOLA.

(Plate I. figs. 4 to 4e, and Plate II. figs. 2 to 2b.)

Membracis flaveola, Oliv., Germ. *Cicada flaveola*, Germ. (Stoll, plate i. fig. 2; Merian, tab. v.). *Membracis flaveola*, Oliv., Germ. *Membracis foliata*, Fabr., Fairm. *Membracis expansa*, Walk. *Membracis foliata*, Oliv. *Cicada foliata*, Linn.

By Mr. Kirby's permission I am able to add the remark that doubts rest on identification of this species. The first part of Walker's description, which should be typical, seems to refer to *M. arcuata*, but it also seems to me to refer to a species like *M. C. album*, but without the first white stripe. The second part of the description refers to *M. C. album*, and the figures quoted to *M. flaveola.*

Size, 18 × 15 mm.

Habitat.—Cayenne, Amazons, Para, Surinam.

Imago (Plate I. fig. 4, and Plate II. fig. 2).—Pronotum almost semi-circular or foliaceous in outline, projecting over the head, pointed behind, flat, formed of two laminæ rising from the shoulders and then ending sharply at the dorsal ridges.

Colour, pale yellow or orange, with a broad brown bar rising vertically from the head, succeeded by a large, oval brown spot behind, which does not reach the apex or the lower margin.

Tegmina dense brown; neurations obscure, but can be made out if placed in balsam. Wings hyaline. Limbal border obvious.

Amongst the adult insects in my collection I have some smaller examples (Plate II. fig. 2) which measure only 10 × 8 mm., whilst the larger measures 18 × 15.

The first are the males. The sex is determined by the form of the last segment of the abdomen as seen in Plate II. fig. 26.

This species is not included in Fairmaire's list nor in the "Biologia Cen. Amer."

Habitat.—Para, Amazons. Bates Coll.

Mr. W. F. Kirby thinks this insect is only a variety of *flaveola* of Germar. It certainly is very constant, but variable in size.

The national collection contains five specimens, from one of which I figure; and the Hope collection at Oxford has seven; and several similar larger insects are in my own cabinet.

The insects from Surinam are much brighter orange, and their bodies are blacker. The male figured is more stramineous, and the body is dusky rufus.

Details are given of the immature form drawn from a specimen in the British Museum (Plate I. fig. 4b).

Pupa.—The immature forms of these insects are very unlike those of the perfect flies.

Body almost colourless and dingy white, more or less covered with patches or tufts of a white tomentose matter, particularly located about the head and back.

The pronotum appears in the form of two reniform lobes, which do not project far over the back, which is therefore uncovered, exposing the mesonotum. The lobes are united in front; abdomen with seven or eight marked somites, each provided with two pointed tubercles ending in long black curved bristles or fine spines; legs stout and furnished with two jointed tarsi, proving thus the immaturity of the insect.

The British Museum contains two specimens of unequal size, taken by Mr. C. W. Clarke of Trinidad. Each shows the incipient form of the pronotum and also the long bristles sprouting from the abdominal rings.

The wing-cases are obvious, and the strong legs show that in this stage of metamorphosis the insect has free locomotion.

The larger one (fig. 4a) is defective, and probably is only the slough of a larva. The other is more perfect, and my above description applies to it only.

Attention may be directed to the pupa of *M. continua*, which I have figured (Plate II. fig. 4a). The two anterior large leaves or plates may represent the lobes seen in the pupa of ✓*M. flaveola*.

Size, 8 × 7 to 7 × 5 mm.

C MEMBRACIS FUSCA.

(Plate I. fig. 5.)

✓*Membracis fusca*, Fairmaire, Ann. Soc. Ent. de France, p. 244. Stål. O *Cicada foliata*, De Geer, t. 32, fig. 14. O *Foliata atrata*, Fab. Sys. Rhyn. 8, 10. *Foliata fusca*, Oliv.

Fairmaire's description is simply "Tota fusco-nigra immaculata." Briefly I add · pronotum deep brown; posterior apex recurved; tegmina dense brown; wings hyaline, with strong dark nervures; body large, and warm sienna brown in colour.

The example I figure is from the national collection in the British Museum. It is remarkable from the very large valves which cover the male genitalia.

Size, 8 mm.

Habitat.—Cayenne, Central America.

D MEMBRACIS CARINATA, Fab., Germ.

Fairm. plate iv. fig. 20, p. 244.

Brown with two white spots.

Habitat.—South America.

D MEMBRACIS FOLIATA.

(Plate II. figs. 1 and 3.)

O *Cicada foliata*, Linn. ✓*Membracis foliata*, Fab. Syst. Ent. p. 675. O *Membracis C. album*, Fairm. Ann. Soc. Ent. Fr. p. 244. Stål. *C. album*. Fowler, B.C.A. p. 5. O *Membracis lunata*, Fairm. p. 244; Stol. t. 5, fig. 24.

Pronotum semi-circular at the rim, which is black. The flat disc is marked by one anterior, upright, white stripe, followed by two others, which, if they united before they reached the lower margin of the pronotum, would form a conspicuous white *C* If they do not so unite, they take the form of the variety *M. lunata* (fig. 3), in which the white stripes are separated.

The rest of the body and the tegmina are dark sooty-black. The tibiæ are broadly spatulate, and the hind legs are slightly serrated. Tarsi small and more or less ferruginous.

There appears to be some confusion in the labelling of this species in the three chief collections known in England—viz., the British Museum, the Hope collection at Oxford, and that of Messrs. Godman and Salvin, and described in the B.C.A.

Canon Fowler is doubtless right in placing *M. C. album*, *M. lunata* (Fairm.), and *M. arcuata* amongst the synonyms of *M. foliata* (Fab.).

Insects from different localities differ in marking and size, but not sufficiently so, to make them separate species.

I believe that the insects marked *M. lunata* in Plate II. (fig. 3)—drawn from a specimen in the national collection—should be taken as *M. foliata* of Fairmaire; and so they appear to be ranged in the Hope cabinet.

MEMBRACIS LUNATA, Fab., Germ., Stoll.

(Plate II. fig. 3.)

Membracis lunata, Fab. l.c. (II); Stoll. l.c. (Y), t. 5, fig. 24; Fairm. l.c. (I), p. 244; Walker l.c. (Z) p. 473.

Membracis lunata, Fairm. p. 244.

Fairmaire remarks that Fabricius confounded this species with *M. C. album*, but that he could not see the passage between one to the other.

Stoll's figure in "Les Cigalles" more nearly represents *M. C. album* than *M. lunata*.

MEMBRACIS FLEXA, Walk., Stoll?

Membracis lunata, Germ. nec Fab.

A single example in the B.M. collection differs from *M. lunata* by the curved form of the middle stripe.

MEMBRACIS CONTINUA.

(Plate II. figs. 4 and 4a.)

Membracis continua, Walk. l.c. (Z) supp. 123.

IMAGO (fig. 4).—Pronotum with anterior much recurved over the head; sooty-black, with lower half creamy-white except over the encephalon; tegmina sooty-black; legs strongly spatulate; body black.

Size, 12 × 9 mm.

Habitat.—Egan, Amazons.

Hope Coll. (Bates).

Grouped with this species is a curious larval form (fig. 4a) labelled from the Hope collection, which I figure on the same plate. Possibly this species may be dimorphic, for its appearance is not that of *M. flaveola* already described.

LARVA.—Warm sienna brown in colour; body with nine segments, each of which bears a broad, pointed, ciliated lamina or flat blade, increasing in length towards the head end.

The whole appears as if the crest of the adult insect had been split into separate parts. The inner platings seem in the specimen to mark the somites of the larva.

The front is truncated and broader than the rest. Legs small; tarsi weak; eyes minute.

Size, 12 × 8 mm.

Drawn from the larva of *M. continua* (so labelled) in the Westwood collection at Oxford, now incorporated in the Hope collection.

Canon Fowler notes that the larvæ of this genus are very curious, being much of the same shape as the perfect insect, but formed of separate upright narrow plates of different heights. *Vide* B.C.A.

He figures six perfect insects of the genus Membracis, taking *M. foliata* of Fab. as the type.

MEMBRACIS MEXICANA.

(Plate II. figs. 5 and 6.)

Membracis mexicana, Guér. Ic. Reg. Anim. *Membracis mexicana*, Fairm. Ann. Ent. p. 248. *Membracis stolida*, Fairm. Ann. Ent. p. 248. *Membracis sexmaculata*, Walk. Homop. supp. p. 59. *Membracis mexicana*, Fowler, B.C.A., Tab. i. figs. 4, 5.

Pronotum slightly raised; colour fine, or sometimes, sordid yellow, with brown spots above the eyes, one behind each shoulder, and two or more spots on the dorsum, also a large one touching both the superior and the inferior borders (*see* fig. 6); tegmina and legs blackish.

This is a species abundant throughout all Central America. It appears very variable as to size and marking, ranging from 6 to 10 mm.

Fowler considers that *M. stolida* represents the larger forms and *sexmaculata* the smaller.

Size is probably connected with locality.

Habitat.—Guatemala, Belize, Honduras, Nicaragua, Costa Rica, Colombia, Panama. I figure two varieties.

In the B.M. catalogue this insect is included in Stål's sub-division *Phyllotropis.*

MEMBRACIS ARCUATA.

(Plate II. figs. 7 and 7a.)

Membracis arcuata, Oliv., Germ. *Cicada arcuata*, De Geer, t. xxxii. fig. 10. *Membracis dorsata* Fab. S. Rh. ii. 26. *Membracis perispheria*, Fairm. plate iv. fig. 15. *Membracis arcuata*, Fairm. plate iv. fig. 25, p. 247.

Fairmaire simply describes this species as black, often interrupted by a white longitudinal fascia. The figure I give well agrees with the outline figure in Fairmaire as above quoted.

Size, 12 × 7 mm.

Habitat.—Brazil.

MEMBRACIS NEBULOSA? n.s.

(Plate II. fig. 8.)

Large. Pronotum with dorsal ridge irregularly sinuate and arcuate. Marginal edge notched above the eyes, then nearly straight to the apex.

Colour fine orange clouded with yellow above the tegmina, with a black dorsal edge irregularly encroaching broadly on the lower yellow band.

Rest of the insect brown. Tegmina dense and broad; limbus corrugated. The two front-tibiæ spatulate. This somewhat striking insect may be distinguished by the angular form of its lower pronotal edge.

Size, 14 × 8 mm.

Kindly lent and figured from Mr. Rippon's collection.

Habitat.—Costa Rica.

MEMBRACIS CELSA, Walk.

Membracis celsa, Walk. l.c. (Z.) *Membracis rectangulata*, Ces.

Habitat.—Brazil (B.M. Coll.).

MEMBRACIS CURVILINEA, Walk.

This may prove to be a variety of *M. arcuata*. There is a single example in the B.M. collection.

MEMBRACIS FUSIFERA, Walk.

A single specimen in the B.M. collection.

Habitat.—Para. The Amazons.

MEMBRACIS ROSEA, Fairm. plate iv. fig. 24.

There is a single insect in the B.M. collection from Brazil, thus labelled.

Fairmaire says it is like *fasciata*.

Pronotum elevated, black, with a broad angular band and with a reddish spot before the apex.

MEMBRACIS CINGULATA, Germ., Fairm.

Fairmaire gives a very short and insufficient description (p. 248, *l.c.*) There is a species thus named in the B.M. from the Amazons.

Habitat.—Brazil.

MEMBRACIS CONFUSA, Fairm. plate iv. fig. 23.

Fairmaire's description is far from explicit; but nevertheless he says it may be easily distinguished by an anterior band which reaches from the head to the shoulders, with a resemblance to *M. arcuata* (p. 247). One specimen in B.M.

Habitat.—Rio Janeiro.

MEMBRACIS EPHIPPIATA, Stål.

Membracis arcuata, Fairm. nec Oliv.

One specimen in B.M.

Habitat.—Brazil.

MEMBRACIS SURGENS, Walk. l.c. (Z), p. 475.

Habitat.—Brazil.

MEMBRACIS (?) PERUVIANA, Fairm. plate iv. fig. 26.

There is a specimen thus named in the B.M. which is certainly not this species, as it wants the first pale spot which appears in Fairmaire's figure and description (p. 249.)

Habitat.—Chili.

MEMBRACIS INTERMEDIA, Fairm. p. 249.

Fairmaire says this insect little differs from *M. peruviana*.

Habitat.—Brazil.

MEMBRACIS (?) MARGINALIS, Walk. l.c. (Z), p. 479.

A very aberrant species. Two B.M. specimens.

Habitat.—Para.

MEMBRACIS TRICOLOR, Fairm. p. 249.

Fairmaire says, "Nigra, fascia antica longitudinali albida, macula postica flava." There are two specimens of *M. singulata* in the B.M. which may be referred to this species; from Para and St. Paul's (Amazons). They may be also compared with *M. curvilinea*.

Habitat.—Colombia, Brazil.

MEMBRACIS ALBOLIMBATA, Fowler.

Fowler, Tab. I., figs. 2, 2a, p. 5.

I have not had an opportunity of seeing this insect, which seems to have been described from one female specimen. Canon Fowler remarks that it may prove to be an extreme variety of *M. foliacea*. He describes it as entirely black, with a clear white border extending from above the head, occupying about one-third of the circumference; punctured; legs fuscous.

Size, 10 × 9 mm.

Habitat.—Central America.

GENUS: PHYLLOTROPIS, Stål.

This genus has much in common with the genus Membracis. A chief character may be seen in the varied proclivity of the Metopidium.

PHYLLOTROPIS SUFFUSA, n.s.?

(Plate III., fig. 1 and 1a.)

In general appearances not unlike *M. mexicana*, but larger, and the brown markings broader, particularly on the posterior part of the pronotum.

Figured from a specimen labelled by Wollaston with the habitat Java.

This Asiatic species does not answer to the Indian *M. fuscata*, Fabr., noted by E. T. Atkinson (Notes on Indian Rhynchota, 1885, p. 79).

Size, 10 × 5 mm.

This insect does not appear in the B.M. collection and it is not noted in the B.M. catalogue.

PHYLLOTROPIS FASCIATA, Stål.

(Plate III., fig. 2.)

Membracis fasciata, Fab. Germ. *Membracis cuccullata*, Ann. Soc. Ent. Fr. sur les Hemip. 534, part 9, fig. 2.

Pronotum sub-arcuate, obtusely pointed in front, with a black patch on the summit followed by a broad bright orange space. The posterior part black with a white globular spot near the apex.

Tegmina sooty-black. Abdomen paler. The first two pairs of legs small, the hind pair long and ciliated, or finely serrated.

This is a handsome and showy insect.

Habitat.—Cayenne, Surinam, Amazons, Wollaston's and Bates Coll.

Size, 12 × 8.

This is the type insect of Stål's sub-family. It certainly is not to be confused with *Enchophyllum cruentatum.*

PHYLLOTROPIS CUCULLATA, Am. and Serv.

Membracis cucullata, Am. and Serv.

Habitat.—Brazil.—Brit. Mus. Coll.

PHYLLOTROPIS FUSCATA.

Membracis fuscata, Fab. Syst. Rhyng. p. 9, 1803; Fairmaire, Ann. Soc. Ent. Fr. (2 sér.) iv. p. 247 (1846); E. T. Atkinson, Indian Rhynchota, p. 79 (1885).

Thorax foliaceous, rounded, fuscous; streak before the anterior margin and posterior band, white.

Atkinson includes this in his Indian Notes, but does not seem to have seen the insect.

Habitat.—E. Indies.

PHYLLOTROPIS TECTIGERA.

(Plate III. fig. 3.)

Membracis tectigera, Oliv. Stoll. l.c. plate xiv. fig. 71. *Membracis elevata*, Fab. Germ. *Membracis tectigera*, Fairm. l.c. p. 246; Walk. list Homop. B.M. p. 477.

Pronotum much elevated; wholly sooty-black, except a spot varying in size near the apex, which is ochreous white; tegmina and legs concolourous.

This species is one of the most plentiful of the genus: there are more than twenty-two examples in the Hope collection at Oxford. Fairmaire includes *M. fuscata*, East Indies, amongst the synonyms, but says he had not seen it for purposes of comparison.

There is a great resemblance between this and the two following species; but until we know something of their life-history it will be safe to think them distinct.

It is doubtful whether the *Membracis tectigera* of Fowler is the same as the insect I figure. Mr. Kirby suspects that this species is only *M. fuscata* with a wrong locality.

Figured from the Miers and the Birchell collections, Oxford.

Size, 13 × 7 mm.

Habitat.—Venezuela, Rio de la Plata, Brazil.

PHYLLOTROPIS ALTA.

(Plate III. fig. 4.)

Membracis alta, Walk. l.c. p. 176.

Pronotum rising high and perpendicularly from the head, then turning with a rounded slope to the apex.

Front edge broadly buff-yellow; the rest brown till near the apex, where it is also buff-coloured.

Legs and tegmina brown, and rather long; tarsi brown.

Size, 12 × 7 mm.

Habitat.—Venezuela; Chimbo, at 1000 feet elevation.

PHYLLOTROPIS NIGRA, Oliv.

Membracis nigra, Oliv.; Stoll, Cic. t. xvii. fig. 92; Fair. l.c. p. 247. Stål. *Membracis compressa* Fab., Germ.

Black; white spot before the apex; see Fairmaire's description.

Habitat.—Brazil and Cayenne.

PHYLLOTROPIS DORSATA, Fabr.

Membracis dorsata, Fabr., Stål. Stett. Ent. Zeit xxv. (1864).

There are several specimens in the British Museum Collection.

Habitat.—Central America.

PHYLLOTROPIS MALLEONOTATA.

Membracis malleonotata, Fairm. l.c. p. 247, Walk. list Homop. p. 479.

Habitat.—Brazil.

PHYLLOTROPIS TRI-FASCIATA.

Membracis tri-fasciata, Stål. *Membracis humilis*, Fowler, B.C.A. (Tab. I. figs. 6, 6a.)

Possibly this is only a variety of the above-mentioned *P. malleonotata*.

Habitat.—Mexico and New Granada; Atoryac, in Vera Cruz.

PHYLLOTROPIS DIVISA, Walk. l.c. Suppt. p. 123.

Membracis divisa, Stål.

Habitat.—Sartarem?—B.M. Bates Coll.

PHYLLOTROPIS TRISIGNATA, Stål.

Membracis trisignata, Stål.

Habitat.—Bogota.—B.M.

PHYLLOTROPIS ZONATA, Fairm.

Membracis zonata, Fairm. plate iv. figs. 16, 19, p. 248;
Walk. l.c. p. 478.

Habitat.—Brazil.—B.M.

PHYLLOTROPIS MEXICANA, Guer., Fairm.

(Plate II. figs. 5 and 6.)

This species has been already described and figured as *Membracis mexicana.*

PHYLLOTROPIS STOLLIDA.

Membracis stollida, Fairm. p. 248; Walk. l.c. p. 478.

Fairmaire refers to a specimen in Westwood's collection, now incorporated in the Hope collection, Oxford. Probably a variety of the last.

Habitat.—Mexico.—B.M.

PHYLLOTROPIS SEXMACULATA, Walk.

Probably a pale variety of *P. mexicana*. It may be compared with *M. ambigua.*

Habitat.—Honduras.—B.M.

PHYLLOTROPIS AMBIGUA, Fairm.

Membracis ambigua, Fairm. p. 249.

Though it has some reference to *P. mexicana* the species has abnormal characteristics. See the B.M. specimen.

Habitat.—Cayenne.

PHYLLOTROPIS CONFINIS, n.s.

(Plate III. figs. 5 and 5a.)

Metopidium perpendicular, then almost semi-circular in outline; colour brown-black, with a pale yellowish band on the procephalic edge, a large reniform pale space above the shoulder, and a pale band before the apex, which last point is black; tegmina dense brown; wings hyaline, with fine black nervures; legs black, with ferruginous tarsi, the hind tibiæ serrated.

This insect recalls *P. provittata*, from Surinam, but there are differences in the height of the crest, &c. Fairmaire's description, by itself, is not sufficient to identify the species with *M. Lefeburei*.

Of the two specimens in the Hope Collection one is a female (Fig. 5a), the other is a defective specimen of the male.

Size, 8 × 9 mm.

Habitat.—British Guiana, Amazons.

PHYLLOTROPIS PROVITATA, n.s.

(Plate III. figs. 6, 6a.)

Pronotum much elevated; warm brown; fore edge obscure; an obscure paler patch above the lower margin; an ochreous band before the black apex; fore tibiæ spatulate; hind tibiæ long and serrated. The example figured was a female, furnished with conspicuous genital valves which cover the piercers or saws.

Size, 9 × 6 mm.

Habitat.—Surinam.

Smaller than *P. tectigera.*

PHYLLOTROPIS SUBTECTA, n.s.

(Plate III. fig. 7.)

In Mr. Jonathan Hutchinson's museum, at Haslemere, I found a *Phyllotropis,* obtained from the Wollaston collection, which appears to be undescribed, but as it is a single specimen I rather hesitate to call it, except provisionally, a new species. The comparatively free position of the pronotum above the abdomen may be caused by the action of the insect's recurved body, and may not be the usual position. The colour of the pronotum, with its crinkled and broad brown border above the yellow laminated disc, may be noted.

Size, 12 × 8 mm.

Habitat.—Para, Amazons. From the Wollaston collection.

PHYLLOTROPIS EXIGUA, n.s.

(Plate IV. fig. 1.)

Small; pronotal crest sub-erect. Metopidium perpendicular, then descending backwards at an angle down the dorsal ridge to the apex. Colour black with a bright orange punctured band above the head, succeeded by a larger orange spot behind; apex of pronotum black; tegmina smoky-black; middle legs sub-spatulate; abdomen black.

Size, 7 × 4 mm.

Habitat.—Bogota. Hope collection.

PHYLLOTROPIS LEFEBUREI.

(Plate IV. figs. 2, 2a.)

Membracis lefeburei, Fairm. p. 246; Fowler (Tab. I. figs. 3, 3a, p. 5.)

Fairmaire describes this insect as intense black, with three white patches of different sizes on the pronotum; tarsi pale. By permission my figure is copied from Messrs. Godman and Salvin's monograph of the B.C.A. The figure there can scarcely be called intense black.

Size, 7 mm.

Habitat.—Brazil, Mexico, Guiana.

PHYLLOTROPIS HUMILIS.

(Plate IV. figs. 3, 3a.)

Membracis humilis, Fowler (Tab. I. figs. 6, 6a, p. 6.)

Rather a small species. Pronotum black, with three white spots; legs black. By permission my figure is from the drawing in the Biologia Centrali-Americani.

Size, 8 × 4 mm.

Habitat.—Vera Cruz.

PHYLLOTROPIS QUADRICOLOR.

(Plate IV. fig. 4.)

Enchenopa quadricolor, Walk. Ins. Saund. Homop. p. 60 (1858). *Enchenopa subangulata*, Walk. l.c. p. 61. *Enchenopa excelsior*, Walk. *Enchenopa humilis*, Walk. *Enchenopa curvicorne*, Walk. *Enchenopa quadricolor*, Fowler, B.C.A. Tab. I. figs. 16 and 17, p. 11.

This species gives a good example of the variability of the genus. Thus the characteristic pronotal horn may or may not be present and the colours are also variable. The red colour on the fore part of the pronotum as given in my figure may be bright or even suppressed, but the white punctured patches seem to be persistent. The eyes, the tarsi, and sometimes the femora are bright red. The hind femora serrated.

Size, 7 × 4 mm.

Habitat.—Mexico, Vera Cruz, Venezuela.

Genus: CRYPTONOTUS,* n.g.

This genus may be best described by the almost unique type specimens, assisted by the diagnosis below, and the figures on the plate.

CRYPTONOTUS MILITARIS, n.s.

(Plate III. figs. 8, 8a.)

Large, with the ridge of the pronotum sinuous-convex; anterior part overhanging the head, and ending at the posterior part with a black point; a semicircular broad whitish band over the region of the shoulders, and a continuous orange-red circular patch over the tail end; the rest of the pronotum is jet black; tegmina dark blackish-grey, with black neuration; first and second pair of legs black, and broadly spatulate.

This showy insect is not represented in the British Museum, but there are two specimens in the Hope collection, one obtained by Birchell from Sao Paulo, Brazil, the other by Bates from the Amazons.

Size, 15 × 9 mm.

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* N.B. κρυπτος, crooked.

GENUS: ENCHOPHYLLUM.

Amyot et Serville, Stål., Fowler, B.C.A. p. 7.

Pronotal horn variable in length, but more or less pointed forwards. Stål subdivides this genus into Phyllotropis, Enchenopa, and Tropidocera.

The species are represented in North, Central, and South America. The Biologia Cen. Amer. figures three of these, but the type *E. cruentatum* is not included in the descriptive list of that work.

The chief difference between this and the next genus, Enchenopa, appears to consist in the absence in the latter, of a carina behind the pronotal horn. Nevertheless, this horn, curved downwards, with a carina of variable length, is also seen in some species of Enchenopa. I must leave it for the present for others to decide whether these characters are sufficiently important to make them generic. I think it now best in this respect to follow Canon Fowler's lead.

ENCHOPHYLLUM CRUENTATUM.

(Plate IV. figs. 5 and 5a.)

Enchophyllum cruentatum, Germ. Silb. Rev. Ent. iii. 226; Am. Serv. Hemip. 534 (Plate ix. fig. 3.). *Phyllotropis*, Stål. Vet. Akad. Handl. (2) 8 (1), p. 62; Fowler, B.C.A. p. 7.

Pronotal crest much as in *Membracis fasciata*, but furnished in front with a strong black curved horn carinated at the sides. Colour bright crimson-red, with the horn springing from a black patch. This is succeeded by a broad black dorsal band, which is carried above the shoulders. The apex is red, with a black point. Body, legs and tegmina dense black. The last with a broad corrugated limbus.

First and second tibiæ spatulate; the last pair simple and finely serrated.

Size, 14 to 12 mm. from tip of horn to end of tegmina.

Habitat.—Rio de la Plata, Brazil.

Figured from an example in the British Museum.

ENCHOPHYLLUM MELALEUCUM.

(Plate IV. figs. 5 to 5c.)

Enchophyllum melaleucum, Fowler, Tab. I. figs. 7 to 7b, p. 7. *Enchenopa melanoleuca*, Walk., l.c. Ins. Sand. p. 59; Fowler, plate ii. fig. 7. *Tropidocera melaleuca*, Stål.

Sooty-black, with a white spot on the metopidium and two others on the dorsum. The carina behind the horn is well marked. This insect has a great resemblance to *E. notata*, but it is larger.

There are three specimens thus marked in the Hope Collection, from one of which my figure is taken (Mier's Coll.).

Size, 13 × 6 mm.

Habitat.—Guatemala and South America.

ENCHOPHYLLUM MACULATUM.

(Plate IV. fig. 7.)

Enchenopa maculata, Walk.

Smaller than *Enchophyllum maculatum* and far less crimson in colour. The two principle spots are orange yellow, that near the eye and that near the posterior point of the pronotum whiter; legs black; tegmina rather greyer.

Size, 8 × 5 mm.

Mier's Coll. in Hope Museum.

Habitat.—South America.

Canon Fowler describes and figures two new species, viz., *E. albidum*, Tab. I. fig. 8, and *E. dubium*, Tab. I. fig. 9, both grey in colour. He figures also *E. melaleucum* of Walker, and notes *E. trimaculatum*, of Stål, as belonging to Tropidocera.

Fairmaire unites Enchophyllum and Enchenopa to the comprehensive genus, Membracis, notwithstanding their different aspects.

GENUS: ENCHENOPA.

ENCHENOPA, Am. et Serville.
Walker, Fowler, Goding.

Pronotum carinated in the middle of the back, and furnished with a compressed horn anteriorly set at an angle. Lateral carinæ abbreviated.

Fairmaire merges this genus into Membracis and he follows Burmeister, by placing it without generic rank in the second section Ensatæ.

It is difficult to see that the presence or absence of the above cephalic process should have so little import.

Stål, on the other hand, cuts up the genus into three, viz., Enchenopa, Campylenchia and Tritropidia. But the genus is so closely united with Enchophyllum that one may hesitate to split it off into more subdivisions.

I commence with Amyot's type.

ENCHENOPA LANCEOLATA.

(Plate IV. figs. 8 to 8a, and Plate V. fig. 1.)

Enchenopa lanceolata, Fowler, B.C.A. p. 9. Fab. *Membracis lanceolata*. Fairm. l.c. p. 251 *Enchenopa lanceolata*, Walk. List of Homopt. Ins. p. 481. *Enchophyllum* (*Tropidocera*) *lanceolatum*, Stål. Vet. Akad. Handl. (2) 8, (1) p. 62 (1869).

Pronotum produced anteriorly into a straight, blunt, short horn, having four or more carinæ, the posterior part ending in a sharp point, slightly projecting beyond the abdomen ; abdomen free from the pronotum, robust and ringed ; colour slate-grey or black; hind-legs stout with coarse serratures; brown. Pronotum much punctured, black, with a conspicuous ochreous spot, succeeded by a smaller one, near the apex, which last is sharp and black. Tegmina black or dark slate-colour, each having a broad corrugated limbus ; wings more transparent.

The frontal portion of the pronotum is straight, and falls perpendicularly to the eyes.

Tegmina with four open apical areas.

Although this insect appears to be typical, Canon Fowler expresses much difficulty in its identification. He says it is much mixed in collections, and even thinks it probable that it is a variation of *E. binotata* to be described afterwards.

Size, 16 × 9 mm.

Habitat.—Columbia.

Figure drawn from a specimen in the B.M. Collection.

ENCHENOPA MONOCEROS.

(Plate IV. figs. 9 to 9b.)

Enchenopa monoceros, Germ. Am. et Serv. p. 535. *Membracis monoceros*, Fairm. p. 253.

Pronotum conical in front ; perpendicular from the head ; concolorous cinnamon-brown, except near the apices of the tegmina, where it is paler. Sometimes also a yellowish patch occurs before the hinder end of the pronotum. Tarsi ochreous-brown. This description only in part agrees with that given by Fairmaire, but it is the average of ten or more specimens in the Hope and the B.M. Collections.

E. monoceros forms the type insect for *Enchenopa* of Am. et Serv.

Size, 9 × 5 mm.

Habitat.—Rio, Brazil.

ENCHOPHYLLUM DUBIUM, Fowler.

(Plate V. fig. 2.)

Enchophyllum dubium, Fowler, Tab. I. figs. 9, 9a, 9b, p. 8.

There is a proximity in this insect to the genus *Enchenopa*, and it seems to be particularly close to *E. albodorsum*, which, however, is differently coloured.

My drawing is from an example kindly lent to me by Canon Fowler.

Size, 8 × 5 mm.

Habitat.—Vera Paz.

ENCHENOPA BINOTATA, Say.

(Plate V. figs. 3, 3a. ♀ and ♂.)

Enchenopa binotata. Membracis binotata, Say. *Enchophyllum binotatum*, West; Fowler, B.C.A. Tab. I. figs. 10a, 10b.

This species varies in the sexes both in colour and size. The male is dark shining slate-grey, with two white or pale ochreous spots on the dorsal ridge of the pronotum; there is a pale patch behind the eye in both the sexes; the female (Fig. 3*a*) is larger than the male, and the pronotal horn is larger, more curved, and more elevated from the back; the colour of the female is a warm ferruginous brown. This insect is fairly abundant from Quebec, New York, to Panama.

Harris says it is injurious to vegetation (pp. 221–224).

There are three specimens labelled *Enchophyllum binotatum* in the Hope Collection: these are labelled by Westwood and by Asa Fitch as ♂ and ♀. They, doubtless, both belong to *Enchenopa*.

Sizes, 6 × 5 and 8 × 6 mm.

ENCHENOPA FULICA, Germ.

(Plate V. fig. 4.)

Enchenopa fulica, Germ. plate iv. fig. 28, Rev. Silb. iii. 225.

Brown, with two whitish dorsal spots: pronotal horns falcate and compressed; flattened on each side; slightly curved; tegmina warm brown, with paler neurations; tibiæ grey; hind pair serrated.

Habitat.—Amazons (Wollaston Collection).

Size, 7 × 4 mm.

My specimen is defective as to the pronotal horn.

ENCHENOPA NUTANS, Germ.

(Plate V. fig. 5.)

Enchenopa nutans, Germ., Fowl. Tab. I. fig. 18, p. 12. *Membracis nutans*, Germ. *Campylenchia nutans*, Stål.

Robust, stout, shining ochreous, with a greyish tint above the pronotum, which has the dorsal ridge nearly straight from the procephalic horn to the posterior apex; two first pair of legs pale, with reddish tarsi; the third pair with brown dots and serrated; tegmina shining, with a broad limbus and reddish nervures.

Stål, in subdividing *Enchenopa*, describes this insect under his genus *Campylenchia*. which appears to be an unnecessary complication.

Size, 10 × 4 mm.

From the Hope Collection.

Habitat.—Panama.

ENCHENOPA EPHIPPII, n.s

(Plate V. figs. 6, 6a.)

Large; general colour warm drab-brown.

Pronotum produced in front to a porrect blunt process, and carried posteriorly to a sharp brown point; the dorsal ridge nearly straight, with a conspicuous oblong saddle-like bright yellow patch; the female is much larger than the male, and has stouter legs; tegmina rather pointed, particularly in the male: each tegmen has a frilled or corrugated limbus at the circumference; the legs of the ♂ are longer, and the hind pair has more strongly serrated tibiæ than the ♀.

Figured from broken specimens fixed on the same pin in the Hope Collection (Miers). This insect recalls to mind *E. lanceolata.*

Size, ♀ 10 × 4; ♂ 8 × 3 mm.

ENCHENOPA GLADIUS.

(Plate V. figs. 7, 7a.)

Enchenopa gladius, Fab. *Membracis gladius*, Fab. *Enchenopa gladius*, Stål., l.c. Vet. Ak. Handl (2) 8, (1) p. 42. Fowler, p. 10, Tab. I. fig. 15.

Pronotum, at the back, of a dusky-red, but with a fine copper-like lustre in a strong light; the procephalic horn long, flat, thin, and scooped when seen from the front: carinations five or more in number; the horn projects forwards and is very erect; hind legs serrated; tarsi small and yellow; tegmina dark brown.

There is only one example in the Hope Collection, captured by Bates on the Amazons, and only one apparently, seen by Canon Fowler, whose figure fairly agrees with that I give; but my specimen is rather larger.

The thin porrect horn distinguishes this species from most others of the genus.

Size, 12 × 4 mm.

Habitat.—Amazons (Bates Coll.).

ENCHENOPA SERICEA, Walk.

(Plate V. fig. 8, and Plate VI. fig. 6.)

Walk. Homop. Ins. ii. p. 493; Fowler, Tab. I. fig. 13, p. 10.

General colour warm ferruginous, with a violet glance; whole insect sparsely covered with delicate white silky hairs; hind-femora slightly serrated; recalls *E. tesselata.*

Size, from tip of pronotum to tip of tegmina 10 × 4 mm.

Habitat.—Chilpancingo, Pueraro, at 4000 feet; Panama, Venezuela.

OENCHENOPA SERRATIPES, n.s.

(Plate V. fig. 9.)

Pronotum bright ferruginous-red, with a dark curved procephalic process having a brown carina and a whitish dorsal streak, which ends in a black point; tegmina dark olive-green or brown; legs reddish, except the tibiæ, which are greyish, with the hind pair strongly serrated.

Size, 9 × 4 mm.

Collected by Bates from the Amazons; figured from an example in the Hope Coll.

CENCHENOPA FERRUGINEA, Walk.?

(Plate V. figs. 10 to 10b.)

Walk. l.c. Hom. In. p. 489 (1851).

General colour ferruginous-yellow, paler towards the tips of the tegmina; eyes and legs redder.

Cephalic horn nearly straight from the dorsum, with two carinations on each side; tip and base of the horn greyer; ends of the tegmina semi-transparent; hind tibiæ serrated and obscurely spotted.

Veining raised above the membranes; limbus broad and corrugated. My figure is rather greyer than usual.

There are four examples in the B.M. Collection. The insects somewhat recall O*E. monoceros*, but the cephalic process is longer and more prone.

Size, 9 × 4 mm.

Habitat.—Venezuela.

O ENCHENOPA TESSILATA, n.s.

(Plate VI. fig. 1.)

Very like *E. minamen*, afterwards described, but smaller and of a dirty brick-red colour, almost concolorous; hind-tibiæ finely serrated; pronotum not powdered with grey stellate dots like *E. minamen*. There are several specimens, all with broken horns, in the Hope Collection from Rio, and Mexico, and also there are specimens collected by Miers in South America.

Size, 8 × 3 mm.

OENCHENOPA LATIPES, Say.

(Plate VI. figs. 2, 2a.)

O*Membracis latipes*, Say., Germar, Fairmaire, p. 252.

Walk. l.c. p. 482.

There are two specimens in the Hope Collection from New York, labelled by

Westwood, one as *E. rectidorsum*, the other as *E. latipes.* There appears to be little difference between them. Notwithstanding the rather straighter dorsal ridge of the former, I conclude them both to be of the same species, and represented by my figure, which was made from an example in the British Museum Collection. The Hope insects are marked "Asa Fitch."

The horn is shortest in the male insect.

Pronotal horn stout, and projecting horizontally, far beyond the head, rather recurved, with a marked carina, extending much beyond the wing insertion; tegmina with stout and rather coarse neuration; posterior apex of the pronotum reaching nearly to the extremity of the tegmina; tibiæ of first and second pair of legs rather spatulate or dilated; hind-legs the longest; whole insect fulvous-brown, darker on the under-side; frons squarish.

Size, 9 × 4 mm.

Figured from a specimen in the B.M.

Habitat.—Pennsylvania.

There is another insect in the Hope Collection labelled *E. latipes.* It is of a bright cinnamon-red, and may be distinct. This last insect was taken by Bates from the Amazons.

ENCHENOPA AUROPICTA, n.s.

(Plate VI. figs. 3, 3a, 3b.)

Pronotum dark brown, with a bright orange-yellow oval patch on the dorsal edge, which patch is complete to the posterior extremity; frons with an orange-yellow squarish stain, and also an irregular one of the same colour on the shoulders and round the insertions of the tegmina; procephalic horn erect and slightly curved forwards; thin as seen from the dorsal aspect, stouter from the profile; tegmina dark greyish black; hind-legs stout and slightly serrated.

Several specimens of this marked insect are in the Hope Collection at Oxford. The hind pair of legs alone are visible from the dorsal view, and of course the eyes are hidden by the pronotum.

Size, 10 × 5 mm.; tegmina expanded = 14 × 7 mm.

Habitat.—St. Vincenti.

ENCHENOPA IGNIDORSUM, Walk.

(Plate VI. fig. 4.)

Walk. l.c. Suppl. p. 124.

Membracis sellata, Stål. l.c. p. 67. *Enchenopa ignidorsum*, Fowler, Tab I. figs. 12, 12a, p. 10.

Smaller than *E. auropicta.* Entirely jet-black except the dorsum, which is covered with a bright yellow patch, spotted; frons without any yellow patches; tegmina black; metopidium with three conspicuous keels.

Size, 7 × 3 mm.

Habitat.—Volcan de Chiriqui, elevation 2000 to 3500 feet.

ENCHENOPA PORRECTA, n.s.

(Plate VI. figs. 5, 5a, 5b.)

Small, robust; procephalic horn stout, obtuse, blunt, curved forwards; the first and second tibiæ dilated, the hinder legs serrated; tarsi fulvous; pronotum in general colour red-ochreous, with a pale ochreous patch on the dorsum, interrupted in the middle by a dark spot; tegmina dense reddish-brown, the hind border dark brown; procephalon densely punctured, as also is the frons; the abdomen of the female furnished with two valves including the saws.

Extreme length and breadth 8 × 4 mm.

Habitat.—New York.

ENCHENOPA SERICEA.

(Plate VI. fig. 6.)

Walk. List Homopt. Ins. ii. p. 493. Fowler, B.C.A. Tab. I. fig. 13.

Colour ferruginous red. Pronotum with a porrect horn, compressed. Insect clothed with yellow pubescence. Minutely punctured. The horn has three carinæ in each side. Hind-tibiæ with stout spines; fore-tibiæ spatulate. Underside black. Tegmina fuscous. Expanse of wings, 14 m.m.

Habitat.—Cuernavaca, Mexico, Panama, Volcan de Chiriqui, Venezuela.

Figured, by permission, from the plate, as above described, in the B.C.A.

ENCHENOPA MINAMEN, n.s.

(Plate VI. figs. 7 to 7c.)

Concolorous dark reddish brown, powdered with small grey stellate dots; pronotum conical, ending anteriorly with a short truncated porrect process; this pronotal portion is easily detached from the rest of the body of the insect; dorsal ridge nearly straight, and much short of reaching the tips of the tegmina; tegmina somewhat pointed and obscurely traversed by curved nervures; legs weak, sordid ochreous, and only slightly spatulate.

The neuration of the figured tegmina is abnormal, and leads to some doubt as to its genus being rightly assigned as above. Additional examples are desirable.

Size, 9 × 3 mm.

Habitat.—Cachabe, Ecuador; "low elevation" (Rosenburg, Nov. and Dec.).

ENCHENOPA ANTONINA, Walk.

Walk. l.c. p. 488.

This insect has much the appearance of *E. ferruginea*, and it may prove to be the female of that species.

It is almost entirely ferruginous in colour, with red tibiæ, but it has a black ringed body, the apex of which shows the usual female valvular opening which contains the saw apparatus.

The cephalic process exhibits from above the carinations at the sides, very prominently.

ENCHENOPA NUTANS, Germ.

Campylenchia nutans, Stål. *Enchenopa nutans*, Fowl. Tab. I. figs. 18, 18a.

Fowler remarks that this insect is allied to *E. curvata*. Stål makes *E. curvata* synonymous with *E. antonina*, *E. venosa*, *E. densa* and *E. frigida*, all of which are noted in Walker's List of Homop. Ins. ii., pp. 488–491.

Campylenchia is made by Stål a sub-genus of *Enchenopa*.

The following additional species are described or figured in the Biologia C.A. by Canon Fowler:

Enchenopa minans, Fowl. Tab. I. figs. 11, 11a, p. 9. *Membracis minans*, Fairm. l.c. Plate IV. fig. 32. *Enchenopa rugosa*, Fowl. Tab. I. figs. 14, 14a, p. 10. *Enchenopa multicarinata*, Fowl. p. 11. *Enchenopa africalis*, Stål, p. 12.

GENUS: TROPIDOCYTA, Stål.

Vet. Ak. Handl. Band. viii. 1869.

A genus with small species like *Enchenopa*, with a rounded anterior pronotum, which is not furnished with a porrect horn; dorsum usually furnished with three carinations; discoidal areas three; limbal border of tegmen broad, corrugated, and often hyaline.

I have not seen *Membracis torva*, Germ., which is typical of the genus.

TROPIDOCYTA SALLÆI, Fowler.

(Plate VII. fig. 1.)

Tropidocyta sallæi, Fowler, Tab. I. figs. 19, 19a, p. 13.

Bolbonota sallæi (Vienna Museum?).

Short; fusco-ferruginous; apical portion of the tegmina abruptly hyaline; central and two side carinæ strongly marked; legs ferruginous.

Figured from a specimen in Canon Fowler's Collection.

Size, 5 × 3 mm.

Habitat.—Mexico, Guatemala, Panama, Caldera; 1200 feet elevation.

OTROPIDOCYTA SUCCEDANII, n.s.

(Plate VII. figs. 2 to 2c.)

Pronotum rounded in front; sub-perpendicular to the frons; dorsal ridge straight and horizontal to the apex; obscure amber-colour, punctured; pronotum with one central keel or carina and a shorter one on each side; metopidium with two small depressions above each eye; hind-tibiæ serrated; tegmina obscurely grey; the apex of pronotum reaches much short of the tegmina.

Size, 6 × 3 mm.

Miers Coll.; Hope Museum.

Habitat.—S. America.

OTROPIDOCYTA MINOR, n.s.

(Plate VII. figs. 3, 3a.)

Small; metopidium, rising at first perpendicularly to the back, and then sloping without protuberances to the posterior apex; pronotum as long as the abdomen; colour sordid-ochreous, with a brown patch at the dorsum, followed by a smaller patch and a still smaller one before the black point; tegmina quite hyaline, with strong yellow neuration, and a broad limbus at the edges of the four apical areas; legs yellowish; the second femora spatulate.

Size, 4 × 3 mm.

Habitat.—S. America (Miers Coll.).

OTROPIDOCYTA GUYANENSIS, n.s.

(Plate VII. figs. 4 to 4c.)

Allied to √*T. minor*, but has the tegmina dense instead of sub-hyaline and with a ferruginous apical part, and limbus; the basal part black; the pronotum has only a single broad ochreous fascia, and the frons between the eyes is undulate or wavy instead of plane. The neuration is much less distinct than in O*T. minor*.

The three specimens in the Hope Collection rather vary in colour.

Size, 6 × 4 mm.

Habitat.—Guana and Amazons (Bates).

O TROPIDOCYTA PUNCTIPES, n.s.

(Plate VII. figs. 5, 5b.)

Rather large; fore part of the pronotum roundly acute; dorsum straight; general colour bright yellow, tinged with red and greenish-grey; abdomen and lower parts fuscous; tegmina sub-acute at the apices, with broad borders; hind tibiæ long, ochreous, with a double row of black spots. Viewed from the back the pronotum shows one central and two side carinæ.

Size, 8 × 4 mm.

Hope Coll. (Miers).

Sub-divisions of genera may be carried too far, particularly in cases where characters run one into another. They often require individual arbitration to settle even the species.

Stål unfortunately is often obscure in the definitions of his new genera, and mostly he fails in stating the species he takes for his type.

As to Tropidocera he says: "Thorax minus elevatus, dorso minus late foliaceous, anterices angulum, apice, rotundatum," &c. &c. Vet. Akad. Handl. (2) viii. p. 41 (1869).

Undue multiplication of genera much harasses the student, and it leads to an involved synonymy.

Tropidocera is not included in Canon Fowler's "Monograph of Membracidæ," and it is not to be confounded with the previous Genus Tropidocyta.

GENUS: LEIOCYTA, Fowler.

This genus has been separated from Tropidocyta by Canon Fowler, chiefly from the number of the carinæ on the pronotum, and more characteristically from the tegmina showing two instead of three discoidal cells. I have not found these last areas easy to distinguish.

About twelve species of Tropidocyta have been noted from America, and of these as examples of Leiocyta, Fowler quotes *L. pallidipennis* (Stål), *L. cornutula* (Stål), and *L. nitida*, all of which are figured in the B.C.A. No venation is there drawn which would help much in their diagnosis.

LEIOCYTA CORNUTULA, Stål.

(Plate VII. figs. 6, 6a, 6b.)

Leiocyta cornutula, Fowler, Tab. I. fig. 22, 22a, p. 14. *Tropidocyta cornutula*, Stål.

The peculiarity of this species is the very short porrect horn on the pronotum.

It is not certain whether this adjunct is simply a sexual character. *L. pallidipennis* may prove to be the ♂ sex of *L. cornutula* (*see* Fowler, p. 14.)

Copied by permission from the B.C.A.

Leiocyta shows only two discoidal areas (*vide* Plate VII. fig. 6b.)

Size, 6 × 3 mm.

Habitat.—Mexico.

GENUS: TYLOPELTA, Fowler.

B.C.A., p. 15.

Small insects distinguished by the wavy and uneven outline of the pronota, which, instead of being nearly straight, are cut out in the middle and before the apex.

Tegmina with three discoidal areas and five sub-oblong apical.

This genus has a close alliance with Tropidocyta on the one hand, and Bolbonota on the other.

TYLOPELTA GIBBERA, Stål.

(Plate VII. fig. 7.)

Tylopelta gibbera, Fowler, Tab. II. figs. 1, 1a, p. 15. *Tropidocyta gibbera*, Stål

Small; general colour pale mottled umber-brown; dorsal ridge very sinuous and rugged; tegmina short and round at the apices, with two clear hyaline spots at the upper and the lower outer margins.

Size, 4 × 3 mm.

Several *habitats* are given in the B.C.A: as Texas, Mexico, Vera Cruz, Guatemala, Panama. Imagoes occur in January.

TYLOPELTA EXUSTA, n.s.

(Plate VII. figs. 8 to 8d.)

Small, irregularly globose; dorsal ridge very sinuous, rough, and sulcated, hirsute; pronotum warm brown, concolorous with the tegmina, which last seem to be almost conterminous with it; wings very small; body black, robust, and ringed; middle tibiæ broadly spatulate and pubescent; hind-tibiæ slender and strongly serrated; frons with the ocelli on a line above the level of the eyes; antennæ obvious.

Like *T. gibbera* this insect appears to be a link between Tropidocyta and Bolbonota. It has much the appearance of a morsel of scorched bark.

Hope Coll., Oxford.

Size, 3 × 2 mm.

Habitat.—Rio.

GENUS: PHILYA, Walker.

List of Homopt. insects, Suppt. p. 126.

The members of this genus are long and shuttle-shaped, with the head (procephalon) developed forwards into a porrect beak, the point of which is often ended by a kind of nail-head process. The eyes are prone to the ground, and cannot therefore see upwards. The pronotum carinated, either curved or nearly straight to the posterior apex; tegmina long, narrow, almost uncovered, with elongated areas. The first two pairs of legs generally spatuliform.

Stål overlooked this genus, which at present however contains but few known species.

0 PHILYA VITRIPENNIS, Fowler.

(Plate VIII. fig. 1.)

Philya vitripennis, Fowl. B.C.A. p. 21.

Pronotum strongly concave in profile; front prolonged into a stout horn with a yellow tip surrounded by a carina; whole surface coarsely punctured and finely hirsute; colour ferruginous-brown; tegmina small, shiny, ochreous, hyaline, and uncovered; fore and middle tibiæ spatuliform; hind-legs flattened.

Miers, figured from the Hope Collection.

Size, 8 × 2 mm.

Habitat.—Mexico, Orizaba.

6 PHILYA BICOLOR, Walk.

(Plate VIII. fig. 2 ♂.)

Walk. l.c. Suppl., p. 126.

Linear, straight, almost stick-shaped; pronotum with three marked parallel carinæ, the middle one with an irregular long ochreous streak; anterior apex of pronotum dilated into a four-square knob; whole surface deeply pitted; colour mottled-ferruginous; tegmina long and narrow, sub-hyaline; tarsi ochreous-yellow; hind-legs long.

From B.M. collection, labelled "Constancia, Brazil" (H. Clark).

Size, 9 × 2 mm.

The female of *P. bicolor* (Plate VIII. figs. 2a, 2b, 2c, 2d).

The colour sordid fulvous-yellow; the pronotal side-carinæ lighter, and prolonged as a marginal streak to the posterior apex; tegmina darker brown; legs black; front tarsi are only slightly spatuliform.

This insect showed under the microscope large abdominal valves, proving its sex, and these valves are figured. Eyes prominent; ocelli high up on the frons. Female larger than the male, though drawn smaller.

Figured from the B.M. Collection.

Size, 13 × 3 mm.

Habitat—Rio (Miss Pascoe's Collection).

O PHILYA STRIGILATA, n.s.

(Plate VIII. figs. 3, 3b.)

Large uniformly dusky fuscous-yellow, except on the head and body, which are brown; pronotum punctured and finely rugose; the procephalon expanded into a flat sword-like process with a blunt tip; strongly carinated on each side; hinder apex not reaching to the tips of the tegmina. There are indications of two blunt suprahumeral processes; front-tibiæ spatulate.

This insect differs somewhat from Walker's type, and shows some affinities to the genus O *Aconophora*, which, however, has no spatulate legs.

Size, 15 × 5 mm.

Habitat.—Brazil (Wollaston Coll.).

O PHILYA PARVULA, n.s.

(Plate VIII. fig. 4.)

A minute species which varies much from the ordinary type and might suggest proximity to the Fulgoridæ; colour dusky ochreous-brown, with the pronotal horn largely developed into a recurved process, with side carinæ; the eye is prominent, and abnormally placed on the side, and high on the head, not prone as usually seen; the tegmina are difficult to distinguish, and the legs are but slightly flattened; the posterior apex blunt; body ringed.

My figure is from a single specimen on card, labelled West Australia (Haswell). It is defective. For the present I locate it in the above genus, but I do so with hesitation.

Size, 5 × 1 mm.

Canon Fowler notes four new species of Philya in the B.C.A., viz., O *P. lituus* (Fowl.), O *P. vitripennis* (Fowl.), O *P. minor* and O *P. dubia*. The two last insects mentioned, he figures. Tab. II., figs. 9 to 9b, and Tab. II., figs. 10 to 10b.

ˇ *Philya dubia* closely runs into the genus next to be described. The series is at present in an uncertain state of arrangement, but the number of species known is too small for present re-grouping.

In the Hope Collection there are two small and injured specimens of Philya labelled from West Australia, but they are too defective for description or for accurate drawing.

GENUS: SCALMOPHORUS,* Fowler.

Fowl. Biol. Cent. Amer., p. 24.

A genus chiefly remarkable for the complex reticulated tegmina. Stål's genus *Æchmophora* differs in not having this reticulation, and in the character of the pronotal horn, "valde nutans" (much bent down?), which scarcely agrees with Canon Fowler's genus.

SCALMOPHORUS RETICULATUS, Fowler.

(Plate VIII. figs. 5, 5a.)

Scalmophorus reticulatus, Fowler, Tab. II. figs. 11, 11a, 11b, p. 22.

Colour concolorous ferruginous-brown; pronotum sharply acute at the anterior end, but rapidly thickening towards the head; dorsum nearly straight, with a row of small obscure white dots on the edge; first and second pairs of legs weakly spatulate; tegmina with a more complex reticulation than that found in Philya. This character and the more robust horn, chiefly marks this insect from that genus.

I give an outline of a tegmen, which has been adapted from the neuration shown in the B.C.A. My drawing is from a rather mildewed specimen kindly lent to me by Canon Fowler.

Size, 7 × 2 mm.

Habitat.—Guatemala; San Gerónimo, 3000 feet; Cerro Zunil, 4000 feet altitude.

Some specimens appear to have more transparent membranous wings than others.

GENUS: HYPSOPRORA, Stål.

Stål, Ofv. Kongl. Vet. Akad. Förh. 26, p. 277; Fowler, B.C.A. ii. p. 25.

Æchmophora, Stål. *Hypsoprora*, Fowler.

Head prolonged more or less into a single erect process (procephalon), the summit of which is round, expanded or obtuse; the dorsum may be sinuous and tubercular, or furnished with rounded smooth humps.

The genus at present contains but few species. When they are more plentiful and better known, probably they may be, with advantage, sub-divided.

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* From a fanciful resemblance to the thole-pin of an oar.

This genus shows no suprahumeral horns such as are to be seen in Pterygia, but it has more or less erect procephalic processes, which sometimes develop at their apices into broadly rounded extensions or swellings.

Canon Fowler figures *Hypsoprora tri-tuberculata*, Stål, Tab. II. fig. 15a–b. p. 25. *H. nigerrima*, n.s. Tab. II. fig. 14–14a, p. 25. *H. anatina*, n.s. Tab. II. fig. 16 p. 26, and *H. coronata*, Fab. Syst. Rhynch. Fowl. Tab. II. fig. 17a–b.

The type forms of Æchmophora, Stål, should be referred to Phylia, but Fowler thinks that *Æ. coronata* should range under Hypsoprora.

HYPSOPRORA INSIGNIS, n.s.

(Plate VIII. figs. 6, 6a.)

Colour ochreous-yellow ; pronotum finely punctured with fuscous spots, particularly on the dorsal and the frontal ridges ; procephalon erect, flattened when seen in profile, and furnished with side-carinæ ; dorsum with a slight rising in the middle, procephalon not serrated like *H. coronata*, but terminated abruptly downwards ; not acute ; tegmina broad and rounded at the tips ; neuration obscure ; first and second tibiæ slightly spatulate and ochreous ; the apex of the procephalon not laterally expanded into a fish-tail outline.

Size, 7 × 6 mm.

Collected by Bates in the Amazons ; Hope Museum.

HYPSOPRORA CORONATA.

(Plate VIII. figs. 7, 7a.)

Hypsoprora coronata, Fowl. Tab. II. figs. 17, 17a, 17b, p. 26. *Membracis coronata*, Fab. *Pterygia coronata*, Stål. *Æchmophora coronata*, Stål. *Pterygia varia*, Walk.

Upper portion ochreous-yellow ; head and body fuscous ; the procephalon erect, flattened, and expanded at the tip when seen in front into a triangular plate like a fish-tail, but in profile seen as a broad blade, serrated at the hinder-edge ; tegmina yellow ; fore front-tibiæ broadly spatulate and spotted ; a tubercle or hump between the shoulders ; dorsum spinose.

Size, 4 × 3 mm.

Hope Collection.

HYPSOPRORA ANATINA, Fowler.

(Plate IX. figs. 1, 1a.)

Hypsoprora anatina, Fowler; l.c. Tab. II. figs. 16, 16a.

Pronotum with a high and erect cephalic horn, which is much dilated in the middle, and has a strong central carina; dorsum sinuous, but with no marked protuberance; edge finely setose from the apex to the summit. Colour fusco-ferruginous, obscurely blotched with a whitish secretion. Tegmina obscurely punctured; rufous, spotted with dark grey; eyes large, and seated in circular rims; frons long; tibia grey, with rufous spots.

Size, 4 × 4 or 6 × 4 mm.

Habitat.—Panama, Bugaba; 3000 feet (Champion).

Figured from Canon Fowler's private Collection.

HYPSOPRORA CASSIS,* n.s.

(Plate IX. fig. 2 ♂.)

Pronotum and the general colour dark brown; frons hirsute and separated from the procephalon (metopidium?) by an arched suture; legs dark brown, but pilose, and rufous in some lights; tibia rather flattened. The figure is drawn from a specimen collected by Wollaston.

I conclude it to be a male, as it wants the large valves, drawn in the plate representing the female insect.

Habitat.—North Australia.

If this locality be rightly given, the occurrence of the species so far removed from America is interesting.

Size, 6 × 5 mm.

HYPSOPRORA CASSIS, n.s. ♀.

(Plate IX. figs. 3, 3a.)

Concolorous, ochreous yellow; procephalon flat, and shaped like that of *H. insignis*, but the apex is broadly expanded laterally, like a fish tail, when seen in front view; the dorsum has a pointed protuberance between the shoulders, and the pronotum is tinged with yellow, and extended to the tail; legs fulvous and subspatulate; tegmina as in *H. insignis*. This insect, collected by Wollaston, is a female. In one aspect the pronotum has the form of an ancient helmet, whence the above specific name is suggested.

Size, 7 × 5 mm.

Habitat.—North Australia.

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* From *Cassis*, a helmet.

HYPSOPRORA COSTATA, n.s.

(Plate IX. figs. 4, 4a.)

Sordid-ochreous, tinged with grey, punctured with brown dots; cephalic horn stout, erect, curved backward and blunt at the apex; dorsum with a truncated, and also with a smaller horn, both brown; a still more minute horn occurs near the posterior end; suprahumerals stout, horizontal when viewed from the front; middle legs with tarsi broad, spatulate, and grey; other legs more slender; tegmina brown, with a conspicuous white costal patch, also a small white spot between it and the apex.

Size, 6 × 4 mm.

Habitat.—St. Vincent.

Drawn from a single specimen in the Hope Coll.

The following species are named by Fairmaire or by Stål, but I have not seen them for drawing purposes. Mr. Kirby thinks they may be referred to the present genus *Hypsoprora*.

Hypsoprora pileata, Fairm. l.c. p. 266, Tab. VII. fig. 28, Colombia; *Hypsoprora cylindricornis*, l.c. Stål, p. 277, Bogota; *Hypsoprora tuberosa*, l.c. Fairm. p. 266, Corientes; *Hypsoprora capitata*, l.c. Fairm. p. 267, Colombia; *Hypsoprora bifida*, l.c. Fairm. p. 267, Cayenne.

N.B.—*H. tuberosa* of Stål, l.c. p. 27, of Bogota, does not seem to be *P. tuberosa* of Fairmaire, who puts these two insects into his genus *Pterygia*.

GENUS: BOLBONOTA.

(Am. et Serv. l.c. p. 537.)

Membracis, Germ. Burm.; *Centrotus*, Fabr.; *Tetraplatys*, Walk. l.c. ii. p. 510; *Bolbonota*, Stål.; Fairmaire, l.c. p. 257; Fowler B.C.A. p. 15.

This genus is in form very unlike all those which have been previously described, yet gradations between the comprised species are so gentle, that their connection with the Membracidæ cannot be well doubted.

The species consist of small globose insects. When at rest their legs are quite concealed under their bodies, but when moving they appear like brown or black creeping corrugated seeds. Their dense colours make it difficult to draw them satisfactorily, even with the help of a strong reflected light.

Sufficient material is not yet available, but when such is offered a patient revision of the group will suggest a subdivision more or less natural in character than that here given.

Dr. Goding[*] has already separated it thus:

Tubercunota.—Posterior process of the pronotum furnished with a high or a more or less compressed spine or tubercle.

Bolbonota.—Prothorax rugose and carinated, not foliaceous; body globular, tegmina with short irregular cells; dorsum slightly bisinuate.

The general characters may be stated thus:

Pronotum sub-acuminate posteriorly, with the sides sinuous; surface rough, corrugated and sometimes carinated; tegmina rounded at their tips with irregular rhomboidal areas, and occasionally variegated with yellow or whitish spots; general colour of the insects sombre brown or black; front tibia sometimes spatulate; the hind legs often prismatic.

Canon Fowler figures five species of Bolbonota in the B.C.A., and notes that the species known are confined to Central and Tropical America, except *B. aurosericea*, which occurs in North America.

Tentatively I here group Bolbonota:

1. Tegmina semi-membranaceous. *B. plicata, B. quadripunctata, B. insignis.*
2. Tegmina wholly membranaceous. *B. trivialis, B. digesta.*
3. Tegmina densely coriaceous. *B. atomaria, B. quinque-lineata.*
4. Tegmina semi-coriaceous. *B. luzonica, B. grisea.*

BOLBONOTA INSIGNIS, Fowler.

(Plate IX. fig. 5, 5a.)

(Fowler, B.C.A. Tab. II. fig. 2, 2a, 3 var. p. 17.)

Broad and shining; head comparatively smooth; pronotum convex, almost arcuate; remotely punctured, and furnished with transverse carinæ; lower margin of dorsum nearly straight; abdomen greyer black, and much ringed; tegmina clouded with brown at the bases and tips; neuration brown, with a brown spot in the centre of each cellule. Difference of locality may explain the comparative smallness of my insect.

Size, 4 × 3 mm.

Habitat.—Vera Cruz (Miers).

Differs somewhat in colouring and in size from the figure given by Fowler.

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[*] See "Synopsis of American Membracidæ," Trans. Amer. Ent. Soc., vol. xix. p. 258.

BOLBONOTA PLICATA, n.s.

(Plate IX. figs. 6, 6a.) *

Small, robust; general colour grey-black or slate-grey; pronotum thrown into folds, the middle portion plicated and notched; the posterior end blunt, and reaching over about two-thirds the abdomen; legs black, with small yellow spots; tibiæ of the second and third pair strongly serrated, but not spatulate; abdomen stout, and distinctly ringed; tegmina short, rounded at the tips, with a corrugated limbus; apical areas four or five, and in colour grey, the rest of the membrane brownish, with six or seven yellow spots, which give the disc a brocaded appearance; wings rounded at the tips and with fine veining enclosing four apical areas.

Size, 3 × 2 mm.

Habitat.—Cachabe, Ecuador.

BOLBONOTA FLAVOPUNCTA, n.s.

Very like the preceding, but the pronotal carinæ could not be clearly seen in the specimen examined; tips of the tegmina pale ochreous, with five fulvous spots in the middle of the disc, and four others nearer the base; the rest of the membrane rich brown; tibiæ of the hind legs serrated; no tibiæ are spatulate; eyes large; rostrum as long as the body; tegmina without limbi.

Size, 4 × 2 mm.

From the Hope Coll. (Miers).

Habitat (?)

BOLBONOTA GRISEA, n.s.

(Plate IX. fig. 7.)

Smaller than *B. luzonica*, the next species to be described; colour ashy-grey; pronotum without dorsal carinations; tegmina one-third pale from the tips, the other two-thirds dark brown; abdomen with the segments edged with white.

The legs both of this and of *B. luzonica* show but little of the spatulate character seen in the ordinary species of Bolbonota.

Size in expanse of the wings, 6 × 3 mm.

Habitat.—Philippines, H. Cuming (Hope Coll.).

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* The different appearance and the non-spatulate tibiæ of this and the following species may suggest a new genus, called provisionally, *Xanthosticta.* On account of the facies of this insect, it is here ranged under *Bolbonota*, but see *Pterygia flavopuncta*, footnote, page 75, where a similar example is figured, and more fully described.

BOLBONOTA LUZONICA, Westw. (♂)

(Plate IX. fig. 8.)

Head wide with prominent eyes; pronotum with a sharp pointed apex; the dorsal part with three rough carinæ separated by deep furrows or sulci; tegmina roundish, orange-brown with whitish tips followed by brownish stains near the apices; one-third near the basis dark brown; wings delicate and hyaline, with four radials and no limbus.

Expanse, 7 × 3 mm.

Taken by H. Cuming, Esq., in the Philippine Islands.

It is named by Westwood, in the Hope Coll.

BOLBONOTA TRIVIALIS, n.s.

(Plate X. fig. 1.)

Pronotum without carinations; metopidium and part of the dorsum ochreous; tegmina dark brown with coarse but obscure neuration; the wings ample and hyaline. In the figure these wings are seen spread outside the tegmina; legs scarcely, if at all, spatulate.

This somewhat obscure insect is figured as being an example taken in the Philippine Islands of a genus usually thought to be exclusively American.

Size, 3 × 2 mm.

Taken by H. Cuming (Hope Coll.).

Habitat.—Luzon.

BOLBONOTA DIGESTA, n.s.

(Plate X. fig. 2.)

Globose; pronotum with a nearly straight dorsal ridge and straight lower margin; apex projects a little short of the rounded and ringed abdomen.

Colour grey black; tegmina smoky-brown, with darker cloudings; second pair of tibiæ broad and spatulate; the third tibiæ longest and coarsely serrated; tarsi yellow and very weak.

Size, 4 × 3 mm.

Mier's Coll.: in the Hope Museum.

Habitat.—Rio Janeiro.

BOLBONOTA QUADRIPUNCTATA, n.s.

(Plate X. fig. 3 to 3e.)

General colour grey-black, punctured ; pronotum with six obscure indentations, forming deep ridges on the dorsum ; apex truncated ; tegmina dark purplish-brown, with paler yellowish neuration, and having two conspicuous white spots on each disc ; nervures fringed with golden hairs ; antennæ obvious.

Hind-tibiæ prismatic and strongly toothed ; fore-tibiæ spatulate with yellow tarsi.

Size of body 3 × 2 mm.

Hope Coll. (Miers).

Habitat.—Brazil.

Except from their minuteness, some of these Bolbonotæ might recall the forms of the Bombi or humble-bees.

BOLBONOTA QUINQUE-LINEATA, n.s.

(Plate X. fig. 4.)

Globose ; small and uniformly umber-brown ; pronotum very rugose, with one central and two lateral ridges or carinæ on each side near the anterior part of the pronotum. The dorsal outline shows one small rounded protuberance near the pointed apex of the posterior end, and a smaller one before the same.

Tegmina short, brownish-red, obscurely veined and with rounded apices ; second tibiæ large and spatulate.

Size 4 × 3 mm.

Miers Coll. Hope Mus.

BOLBONOTA ATOMARIA, Walk.

(Plate X. fig. 5, 5a, 5b.)

Small, coal-black, shining ; finely punctured ; very rugose ; pronotal apex sharp, but not reaching to the tips of the tegmina ; the wings are inconspicuous, and lie very closely to the abdomen ; first and second tibiæ spatulate ; hind tibiæ simple, but serrated ; metopidium with five carinæ ; tarsi ferruginous.

Size 4 × 3 mm.

Pascoe Coll. in the B.M.

Habitat.—Rio Janeiro, S. America.

BOLBONOTA TETER, n.s.

(Plate X. fig. 6, 6a.)

Large, almost uniformly shining black; much punctured; dorsum with a small round tubercle rising above and between the shoulders, and another larger tubercle in the middle of the dorsum; posterior apex rather blunt, and reaching nearly to the tegminal tips; tegmina black, with dusky brown and sub-hyaline tips; metopidium perpendicular; eyes small.

This species has affinities with Hypsoprora, and from its comparatively large size possibly it might be thought to be better there placed.

Size 8 × 4 mm.

Hope Museum (Miers Coll.).

Habitat.—Brazil.

BOLBONOTA CUNEATA, Fowler.

(Plate X. fig. 7.)

Fowler, B.C.A. l.c. Tab. II. figs. 4, 4a, 4b.

Small, black and shining; coarsely punctured; pronotum cuneiform; tegmina black, with the central part more hyaline; apical margin almost unicolorous. Has some affinity with *B. insignis.*

Copied by permission from the B.C.A.

Size 3 × 3 mm.

Habitat.—Buguba, British Honduras, Costa Rica, Panama.

BOLBONOTA CORRUGATA, Fowler.

(Plate X. fig. 8.)

Fowler, l.c. Tab. II. fig. 6, 6a, p. 19.

Not unlike *B. insignis,* but smaller, and with the sculpture of the pronotum stronger; tegmina with white or yellow spots; apex usually with a small hyaline patch.

Size 3 × 2 mm.

Habitat.—San Miguel, in the Pearl Islands.

BOLBONOTA RUBRITARSA, n.s.

Tegmina with large costal horny patches, approaching here to the characters of a true Hemipteron; the membrane stained yellow and brown, each wing having a broad limbus; abdomen deeply ringed; pronotum strongly carinated; second tibiæ dilated, with red tarsi; hind legs long and coarsely serrated.

Hope Museum (Miers).

Habitat.—S. America.

The following species are described by authors, but I have had no opportunity for studying their identification. Their names have been kindly given to me by Mr. W. F. Kirby.

o *Bolbonota globosa*, Fairm. l.c. p. 257, Colombia.
o „ *pusilla*, Fairm. l.c. p. 258, Colombia.
o „ *melæna*, Germ. l.c. iii. p. 229; Fairm. l.c. p. 258, Brazil.
o „ *aurosericea*, Stål, l.c. p. 24, Rio Janeiro.
o „ *flavicans*, Fairm. l.c. p. 258, Brazil.
o „ *nisus*, Germ. l.c. p. 229; Fairm. l.c. p. 259, pl. iv. fig. 8.
o „ *pictipennis*, Fairm. l.c. 258; Fowler, l.c. p. 18, Mexico.
o „ *lævior*, *var.*, Fowler, l.c. p. 18.
0 „ *inconspicua*, Fowler, tab. ii. fig. 5, p. 17.
0 „ *corrugata*, *var. minor*, Fowler, tab. ii. fig. 6, p. 18.
0 „ *inæqualis*, Fowler, tab. ii. fig. 17, p. 19.

oGENUS: BOLBONOTODES, Fowler.

Allied to 6Bolbonota, but larger; upper surface very rough and carinate; the tegmina have five apical and four discoidal areas; the wings have five apical areas. In Bolbonota the tegmina have five apical and two discoidals; the wings also have only four apicals.

6 BOLBONOTODES GANGLBAUERI, Fowl.

(Plate X. fig. 9, 9a, 9b.)

Fowler, Tab. II. fig. 8, 8a, 8b, p. 20.

"A distinct and extraordinary insect, difficult to describe."

My figures are copied from the B.C.A., kindly permitted by the authors.

Size 6 × 4 mm.

Habitat.—Orizaba, Mexico.

PTERYGIA.

Notwithstanding all that has been written, the doctrine that every organ of an animal has some connection with its beneficial economy must be put aside. A competent authority remarks, that not one of the higher animals can be named which does not show, in some part of its body, a rudimentary condition.* Yet the interesting fact remains, that even when an organ is prejudicial to the welfare of an animal, it is not necessarily suppressed. Apparently useless organs, like the mammæ of the male, still persist through ages of possible modification. From the law of Causation we must infer that all effect is the result of purpose, unless we adopt the illogical and inefficient doctrine of Necessity. Intelligence, we may think, should not produce what we may conceive to be effete organs. Do we not thus argue from imperfect premises?

Unfortunately, as to the development of the Membracidæ, we are without any testimony of their existence in the rocks; for they seem to contain no fossil remains, either adult or larval, to show us the processes of either evolution or degeneration. Yet there would appear to be no adequate reason why such forms should not figure in the great insect deposits of America, and particularly in those districts where the living insects are now so plentifully scattered.

It has been said that no animal form which has once become extinct can again arise: this may be rather a hazardous statement to make.† The insect productions of East Africa, at one time supposed to be unique and peculiar to the island of Madagascar, can now be met with on the coast round about Natal and Zanzibar. To meet this and similar facts, Darwin explains that species that were once widely distributed, sometimes have suffered much extinction in their struggles for existence. Isolated species and genera, it is suggested, may thus be the sole existing remnants of a once numerous group.

The extraordinary structural additions to the pronota of Pterygia and other genera are not confined to a few Membracidæ developed in sporadic centres. They occur over wide areas, separated by deserts, seas, and mountain ranges.

Genus: PTERYGIA, Laporte.

Ann. Soc. France, i. p. 221 (1832); Fairm. l.c. p. 263; Stål, Öfv. Vet. Akad. p. 276; Fowler, B.C.A. p. 23; Walk. List. Homop. ii. p. 499, Suppt. p. 127; Notocera. Amyot. et Serv. l.c. Hemip. p. 536.

Head sloped (échancrée) on each side and scooped; eyes large; ocelli placed close to the eyes, and near the prothorax; pronotum rugose, tuberculate and generally spinous; suprahumeral processes of variable lengths; dorsum with two or else three tubercles, blunt at their summits, and unequal in size. The known species of the genus hitherto described are all inhabitants of America.

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* "Descent of Man," vol. i. p. 17.

† See this subject discussed by W. F. Kirby, "Evolution and Natural Theology," p. 116 (1883).

Fairmaire divides the genus into three sections:

A. Cornes humérales, très saillantes.
B. Cornes très courtes ou rudimentaires.
C. Prothorax renflé au-dessus de la tête.

Walker notes twenty-three species represented in the British Museum Collection.

Stål divides the group into four genera, viz.: 1. Notocera; 2. Pterygia; 3. Hypsoprora; 4. Æchmophora: which last probably is the same as Philya, and should be separated from Pterygia of Fairmaire.

Canon Fowler adds and describes *P. bituberculata* and *P. cerviceps* as new species, p. 24.

It may be noted that Pterygia may or may not have humeral processes, but the encephalon always has two suprahumeral horns which may be either branched, cleft, clavate or truncate.

The tendency to develop budding horns below the suprahumeral processes is well shown in Pterygia. The angular prominences which might be called the humeral points are markedly seen in *P. cerviceps* and in *P. arietina.* The suprahumerals in reality belong more to the characters of the encephalon, which will be better seen in the later genera Cyphonia and Bocydium.

PTERYGIA ARIETINA, Fairm.

(Plate XI. fig. 1.)

Germar, Oxyrhachis Rev. Silb. III. p. 308; Fairm. *P. arietina,* l.c. p. 263.

Pronotum with two short truncated suprahumeral processes; metopidium perpendicular, rough, with minute spines; dorsum spinous, with a single conical protuberance; tibiæ spatulate, but not broadly so; hind tibiæ fimbriated; colour sooty-black, with white fur-like patches powdered with black dots; tegmina warm reddish-brown, likewise flecked with white; abdomen large.

Size 5 × 4 mm.

From the B.M. Coll.

Habitat.—Rio Janeiro, Brazil.

PTERYGIA CERVICEPS, Fowler.

(Plate XI. fig. 2.)

Fowler l.c. Tab. II. figs. 12, 12a, p. 24.

General colour sordid brown, sparsely patched with white pilose matter, with interspersed dots; suprahumeral processes longer than those shown in the insect marked *P. satanas* of the B.M. Collection; thickest at their apices, and slightly cleft; dorsum with three tubercles slightly spinose; the central tubercle the largest; tegmina reddish-brown and unspotted; tibiæ greyish-fuscous.

Size 6 × 5 mm.

Habitat.—Panama, Bugaba, Caldera; 1200 feet elevation.

This insect is not unlike *P. exaltata* of Walk.

PTERYGIA HISPIDA, Fairm.

(Plate XI. fig. 3.)

Fairm. l.c. pp. 265–7.

Brown, covered more or less with a greyish coat; suprahumerals truncated. Pronotum prolonged into three elevations, the first of which is placed as a small point at the base of the humeral processes.

Size 5 mm.

Hope Coll.: Westwood.

Habitat.—Colombia, Colorado, Celebes (Gory).

PTERYGIA POSTICA, ♂, n.s.

(Plate XI. figs. 5, 5a.)

Small; metopidium convex, with two rather short suprahumeral processes, flat, curved, notched at their tips, and spinous; the pronotum rises into a small spinous hump, and then is carried backwards at an angle, where a larger protuberance is developed, the surface of which is reticulated like that of a small fir-cone; this part of the pronotum rises clear from the dorsum, as is often seen in Centrotus; abdomen cut into rings, and ending with an obtuse apex; tegmina obscure brown, with a faint neuration; wings hyaline; tibiæ flattened, but not markedly so. The female is larger, and has orange spots on the abdomen.

Sizes respectively 4 × 5 and 5 × 5 mm.

PTERYGIA POSTICA, n.s. ♀ (?)

(Plate XI. figs. 4, 4a.)

Body furnished with numerous small yellowish spinules; pronotum black, with two erect suprahumeral processes, bluntly truncated at the tips; the dorsum spinous, with a large rounded posterior hump, which is broadly honeycombed on the surface, and rises almost over the region of the tail; abdomen black, with obscure yellow spots; legs large, robust, with the tibiæ slightly spatulate; tegmina brown; wings hyaline.

Size 5 × 5 mm.

Hope Coll.: Westwood.

Habitat.—Manila, Philippine Islands.

PTERYGIA DÆMONIACA, n.s.

(Plate XI. fig. 6.)

Uniformly black; very spinose; pronotum dilated between the suprahumerals, which are flattened, scooped out, and truncated at the tips; the dorsum with an erect blunt tubercle, much spined; head large; clypeus foliaceous and more fuscous in colour; fore and middle tibiæ only slightly spatulate; hind-legs prismatic; tegmina short and obtuse at the tips.

Viewed from the side this insect has a spiteful appearance, whence the specific name above given.

Size 7 × 6 mm.

From the Wollaston Coll.

Habitat.—Amazons.

PTERYGIA SATANAS, Fairm.

(Plate XII. figs. 1, 1a.)

Fairm. l.c. p. 264; *Trayopa satanas*, Lesson, Ill. Zool. pl. LVI., fig. 2.

Whole insect densely black, variegated with dead-white furry patches, punctured with black; frons leaf-like, longer than broad; suprahumerals flat, expanded at the tips, and serrated at the edges; dorsum spinous, inflated above the head, and raised at the back into a hump, which is continued to the apex just beyond the length of the tegmina; tegmina black, with ochreous tips; abdomen stout and mealy; tibiæ spatulate, densely white, and dotted; tarsi brown. The insect has a curious piebald appearance. The figure is from that of a female similarly labelled from the B.M. Collection.

In the Hope Collection at Oxford there is an insect marked *P. bituberculata*, Fowler, which appears to me to be identical with the species marked *P. satanas*, Fairm., in the B.M. Collection. This species has certain similarities to *Pterygia crassicornis*, but it has only one dorsal process.

I have no doubt that my insect from Brazil is identical with that figured in the B.C.A. as *P. bituberculata* from San Juan, Vera Paz.

I have examined a fine specimen kindly lent me by Canon Fowler, which more closely approaches my drawing than that figured by him in the B.C.A., which is represented by the artist much too white.

PTERYGIA RUBICUNDA, n.s.

(Plate XII. fig. 2.)

Obscure ferruginous red; pronotum with two dorsal spinous humps, the anterior process the smallest; suprahumerals erect, rather short, and blunt at their tips; body sparsely spotted with white; tegmina ferruginous, with a faint white bar across the middle; metopidium convex and finely spinose; first and second tibiæ spatulate, greyish and spotted; third tibia long and rather slender.

Size 5 × 4 mm.

From the Miers Collection.

Habitat.—Brazil.

The insect recalls *P. spinula* from the Philippine Islands.

PTERYGIA UROPIGII, n.s.

(Plate XII. fig. 3.)

Black; pronotum finely spined, with two suprahumeral horns, broadly expanded at their tips; a white streak proceeds from each shoulder to the apex of the pronotum, which is remarkable from the large development of the caudal end into a naked horn, set at right angles. There is also a smaller spined tubercle, placed more over the dorsum. The streaks are dotted with black points.

Another broad white patch commences under the shoulders, and is continued below the tegmina, which are very weak; so much so as to lead almost to the belief that this insect was in the pupal stage. The presence, however, of small ocelli renders this immaturity unlikely.

Eyes ochreous; legs black, the first pair powdered with white.

The chief character of this insect is the process or hump at the posterior extremity, and the small development of the wings, &c.

The dorsum and the anterior processes are all clothed with small black spines.

Size 6 × 5 mm.

Hope Collection (Bates).

Habitat.—Amazons.

PTERYGIA SPINULA, n.s.

(Plate XII. fig. 4.)

Pronotum carinated and densely tuberculate, studded more or less with short black spines, interspersed with small ochreous papillæ; the anterior part furnished with two flattish processes, which rise above the shoulders, truncated and spreading at the tips; the dorsum has a small spinous tubercle followed by a larger one over the tail; the pronotum extends to the apex of the abdomen, and has a sinuous edge; eyes large and hemispherical; legs ochreous or rufous; the second tibiæ flattened and spatulate, the third rather less so; tarsi very small; tegmina sienna-brown in colour, mottled, with a greyish or nearly white patch on the disc; the rest of the insect is umber brown; abdomen very dark. General character spinose, interspersed with small ochreous points or prickles.

Size 5 × 4 mm.

Habitat.—Luzon, Philippine Islands.

Allied to *P. cerviceps.*

PTERYGIA HORRIFICA, Westwood.

(Plate XII. fig. 5.)

Westw. (Centrotus), Walk. l.c. p. 500.

Small; brown, with ferruginous tegmina and legs; the suprahumerals are clubbed and notched at the apices; the whole insect more or less spinose, with the dorsum showing one large hump at the caudal end, and a smaller one between it and the suprahumeral horns.

Size 5 × 5 mm.

The Philippine Islands seem to share with South America in having this and several other species of this genus, originally thought to be peculiar or special to the New World.

PTERYGIA CONCOLOR, n.s.

(Plate XII. figs. 6, 6a.)

Small; colour ochreous-brown; suprahumerals short, blunt, and not cleft; pronotum with two moderate-sized tubercles, one of which is dorsal; finely setose; tegmina finely pilose, with two large ochreous patches on the disc, and smaller ones on the costa and the apex.

Approximates to *P. exaltata* (Walk.).

Size 4 × 3 mm.

Habitat.—Brazil (?).

Hope Collection (Miers).

PTERYGIA NOX, n.s.

(Plate XII. figs. 8, 8a.)

External appearance not unlike a Tropidocyta, but perhaps it more recalls *Pterygia arietina.* Viewed from the front, this insect shows two short horns convergent at the tips, but there are no white mealy patches on the tegmina and pronotum. The dorsum has two prominent rounded tubercles. The whole insect is jet black, finely spined, and stippled with dark depressions.

Size 5 × 4 mm.

Habitat.—Brazil (?).

Hope Collection (Miers).

PTERYGIA QUADRIDENS, Fairm.

(Plate XIII. fig. 1, 1a.)

Fairm. l.c. p. 264; Walk. l.c. p. 499; Suppl. 127.

Uniformly black, with divergent antler-like horns, which are spoon-shaped and dilated at the tips; dorsum with a central protuberance, succeeded posteriorly by a smaller one; whole pronotum covered with small spines; sundry white flannel-like spots are dispersed over the body and the tegmina; these last organs are reddish in colour and spotted; tibiæ flattened.

Bates obtained several examples from Ega on the Amazons. These specimens are browner in colour, but in general particulars they agree with the other insects in the Hope Collection.

This insect is not *P. crassicornis* of Brazil, yet neither this nor *P. quadridens* are described as being powdered or blotched with white.

Size 7 × 5 mm.

Habitats.—Cayenne, Ega and St. Pauls, Amazons.

PTERYGIA TENUICORNIS, n.s.

(Plate XIII. fig. 2.)

In general form not unlike *P. tripodia*, but the colour is bright ferruginous, and the whole body is roughly honeycombed by depressions. The tegmina are grey, and the neuration is indistinct; the tibiæ large, broad, and spatulate; tarsi very small. It is possible that this insect may prove to be the female of *P. tripodia.*

Size 7 × 5 mm.

Habitat.—Amazons.

Bates (Hope Collection).

PTERYGIA TRIPODIA, Fairm.

(Plate XIII. fig. 3, 3a.)

Fairm. l.c. plate vii. fig. 30, p. 263; Walk. *Pterygia trepida* (? misprinted for *tripodia*), l.c. p. 499.

Black; pronotal horns slender, straight, or nearly so; tips slightly clavate; body covered with fine spines; the dorsal aspect of the pronotum shows one small pointed process, and a square-headed process over the posterior end; legs black, with the second and third pair of tibiæ spatulate; the tegmina dark, and when viewed at an angle feebly iridescent.

Figured from the Hope Collection. Bates' Collection in the B.M. gives the

Habitat.—Villa Nova.

Size 6 × 4 mm.

PTERYGIA FLAVOPUNCTATA, n.s.*

(Plate XIII. fig. 4, 4a.)

There is a small unlabelled insect in the Hope Collection which does not agree well with either the genus Pterygia or Bolbonota. One of its characteristics consists in all the tibiæ being non-spatulate, and the hind-legs spinose. In colour and marking it shows some alliance with *Bolbonota luzonica* (Pl. IX. fig. 8). From a few examples I hesitate to make a new genus. Femora bright ochreous; tarsi black; tegmina with tips ochreous and the rest brown, spotted with yellow. Probably this insect is identical with *Bolbonota flavopunctata*, though it is here placed under a different genus.

Habitat.—S. America.

Hope Collection (Miers).

PTERYGIA INCOGNITA, n.s.

General colour reddish-brown, without any mealy white spots; second dorsal hump inconspicuous; supra-humerals short and thick, with clavate tips which are rather pointed at their extremities; metopidium greyish; dorsal pronotal ridge finely spinous, the surface punctate or finely tuberculose; general form like that of *P. satanas*.

Habitat.—Amazons.

Bates Collection at the Museum, Oxford.

The following species of the genus Pterygia are contained in the cabinets of the British Museum but are not figured in this monograph:

Pterygia macquartii, Lap. Ann. Soc. Ent. Fr. p. 221; Fairm. l.c. p. 265; pl. 6, fig. 6, Brazil. *Pterygia exaltata*, Walk. l.c. p. 502. *Pterygia brachycera*, Fairm. l.c. p. 265, Brazil. *Pterygia maculosa*, Walk. Ins. Saund. p. 65, Amazons. *Pterygia punctuosa*, Walk. l.c. p. 65. Probably this last insect is a variety of *P. maculosa*.

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* I have before suggested that a new genus Xanthosticta may be formed to include these anomalous species. It might comprise *Bolbonota flavopunctata*, *Bolbonota plicata*, *Bolbonota grisea*, and *Bolbonota luzonica*.

SPHONGOPHORUS.

In the genus Sphongophorus we seem to arrive at the height of specialisation of the pronotum as regards form. The contortions assumed are most varied in character, but their significance or advantage to the insects is not obvious. Nevertheless, we cannot well doubt that the assumption of bark-like and lichen-tinted characters are for protective purposes. The appearances of the insects are very deceptive to our eyes. If we could certainly prove that birds or parasitic insects are natural enemies to Membracidæ, they might thus be cheated of their natural prey.

Bates' assertion that "variation in animals may be sudden, discontinuous, and considerable," appears to stand on the secure ground of fact. Violent "sports" certainly do here occur in unexpected directions.

GENUS: SPHONGOPHORUS.*

Fairmaire, l.c. p. 260; *Hypsauchenia*, Germ. Am. and Serville; *Centrotus*, Kirby, Westwood, 1829.

Head trilobed; ocelli placed in a line passing through the middle of the eyes; pronotum very variable in form; sometimes arcuate, sometimes blown up into bladder-like processes, or erect and recurved into clavate protuberances; tegmina elongated; anterior tibiæ dilated or spatulate; hind tibiæ prismatic; scutellum covered.

The old-world genus Hypsauchenia has a considerable resemblance outwardly to the above genus, but the tibiæ are not spatulate, and the scutellum is uncovered. There are differences also in the neuration of the wings, so that Hypsauchenia must be grouped nearer to the Centrotidæ.

Sphongophorus, perhaps, shows the most extreme departures from the ordinary forms of the pronota of insects. Many species, as before stated, look like moving pieces of the gnarled bark of trees or pieces of detached fungus.

The twisted masses are often grotesque, and we may think them extravagant. We do not yet know what are the natural foes of the Membracidæ, and therefore we are left to conjecture how these disguises, for such they appear to us, operate as protective. The masking can hardly be doubted, notwithstanding our difficulties in explaining the correlation of insect vision with that of mammals.

Although the genus Sphongophorus is in itself so varied in form, and one subgenus may pass almost insensibly into another, it may be conveniently divided into sections, as Stål and Fowler have done; with certain additions.

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* From *σφογγος*, a sponge.

SYNOPSIS OF SPHONGOPHORUS.

	ANTERIOR PROCESS.	POSTERIOR PROCESS.
1. SPHONGOPHORUS .	Long, flat, slender, curved backward.	Simple, generally long, curved to meet the anterior process, so as nearly to complete a circle.
2. CLADONOTA, Stål .	Long, sinuous, dilated in middle, apex sometimes cleft, (sexual ?)	With two (or three) globular knobs, rising from the dorsum, hind apex straight and free.
3. LOBOCLADISCA, Stål .	Stout, erect, recurved, clavate with a tubercle on the inner edge.	Long or longer than the anterior process, fungoid or tubercular, globose.
4. ACANTHONOTA, N.G.	Long, fusiform, spatulate, with an inner thorn.	Long, sharp, not tuberculate, posterior apex truncate.
5. LECYTHIFERA, Fowler	Recurved, apex tuberculate.	Dorsum much inflated, fungoid and punctate.

SPHONGOPHORUS (LECYTHIFERA) CHAMPIONI, Fowler.

(Plate XIII. fig. 5.)

Fowler, B.C.A. Tab. III. fig. 1, 1a, p. 28.

Allied to *S. ballista.* Pronotal cephalic process slender and curved behind, widened at the apex into a subtriangular swelling or club; the posterior end terminated in a short thick reflexed process, set at right angles to the pronotum itself; between this and the pronotal horn a thick somewhat hammer-shaped protuberance, coarsely punctured, points backwards; tegmina black, but fuscous towards the apices; a testaceous band or strip occurs near the eye; legs fusco-testaceous.

Size, 6 × 6 mm.

Habitat.—Guatemala, El Reposo, 800 feet.

Copied by permission from the B.C.A.

SPHONGOPHORUS (LECYTHIFERA) ROBUSTULUS, Fowler.

(Plate XIII. fig. 6, 6a.)

Fowler, B.C.A. Tab. III. fig. 3, p. 29.

Small, rugose, brown in colour; metopidum lighter; procephalic process curved backwards and ending in a bilobed club in the male insect, but hardly thus dilated in the female; dorsum furnished with a short thick stalk, which carries a large round and punctured tubercle; the posterior end terminates in a small triangular process; tegmina brown and unicolorous.

Size, 5 × 5 mm.

Habitat.—Dueñas (Champion); Accitumo (Salvin).

Copied by permission from the B.C.A.

SPHONGOPHORUS BALLISTA, Am. Serv.

(Plate XIV. fig. 1, 1a.)

Hypsauchenia ballista, Germ. l.c. p. 231. *Sphongophorus ballista*, Walk. l.c. p. 197. *Sphongophorus ballista*, Fowler, l.c. Tab. II. fig. 18, 19, p. 27. *Sphongophorus claviger*, Stål. p. 68. *Sphongophorus apicalis*, Stål. l.c. p. 273.

Pronotum produced forwards and then backwards into a long flat thin horn rising above the shoulders, which nearly meets a shorter erect horn on the posterior extremity of the pronotum, and this almost completes a circle; colour brownish-grey, punctured; tegmina long and narrow; the apical portion sienna-brown, with a broad limbus; two small pale patches are sometimes seen at the insertions; legs ochreous; first and second tibiæ at least, spatulate.

Fowler notes that the B.C.A. Collection is very large, and comprises more than one hundred examples. They greatly vary in the shape of the processes of the pronotum; as a rule, in those forms which represent the males the apices are knobbed, whilst in the females they are cleft. There is also much variation in the posterior processes, some of which are porrect, as in my figure of a male taken from the Hope Collection.

Size, 12 × 10 mm.

Habitat.—Mexico, Guatemala, Panama, Bogota, Demerara.

SPHONGOPHORUS CLAVIGER (var?), Stål.

(Plate XIV. fig. 2, 2a.)

Sphongophorus claviger, Stål. l.c. Stett. ent. Zeit. (1864), p. 68.

This insect differs in several particulars from that immediately preceding, but after what Canon Fowler has noted, hesitation may arise as to deciding its real specific value.

The insect is smaller, and wants the process at the pronotal posterior apex; the procephalic horn is also clavate as well as cleft, and here it approaches one of the characteristics of the Old World genus Hypsauchenia; there are besides conspicuous grey patches on the shoulders and below the wing insertions.

The figure above is drawn from one of several named B.M. examples, but it does not well agree with that given in the B.C.A. monograph.

Size, 8 × 12 mm.

Habitat.—Mexico.

SPHONGOPHORUS (CLADONOTA) PARADOXA, Germar.

(Plate XIV. fig. 3, 3a, 3b, 3c.)

Germ. l.c. 26, t. 1. fig. 1. Fairm. l.c. p. 261.

Brown; the procephalon is erect, recurved, and long, dilated in the middle, and marked with a strong central carina; the apex in the male is cleft like a fish-tail, but in the female the apex is simple. There is considerable variation in the curve of this horn, it being more sinuous in some examples than in others; the dorsal process is constricted into two globose knobs, with a smaller apical one, which suggests the form of the safety-valve apparatus on a locomotive engine; surface as well as the tegmina finely punctured; the last membranes are corrugated, sienna-brown, and greyish at their bases; the males have three faint greyish spots at their apices; first and second tibiæ pilose and spatulate.

My figures are from specimens in the B.M. Collection.

Size, 8 × 11 mm.

Habitat.—Constancia, Brazil. January.

SPHONGOPHORUS (CLADONOTA) NODOSUS, n.s.

(Plate XIV. fig. 4, 4a, 4b.)

Concolorous shining black, except the tegmina, which are warm sienna-brown, with a greyish tint at their bases, for about one-third; venation strong and darker; the procephalic horn is gnarled, rugose, and twisted into tubercles over the back, and stands erect; a globose tubercle, surmounted by a smaller one, is on the dorsum, the posterior apex of which does not reach to the tips of the tegmina.

This curious insect has much the appearance of a piece of gnarled bark, and it must conceal itself very effectively. I cannot identify it with any described species. It does not agree with either *S. ridiculus* or *S. ludicrus* of Walker.

Size, 10 × 8 mm.

Habitat.—Unknown.

B.M. Collection.

SPHONGOPHORUS (LOBOCLADISCA) BI-CLAVATUS, Westw.

(Plate XIV. fig. 5.)

Fairm. l.c. p. 262, Pl. iv. fig. 4. Fowler, B.C.A. Tab. III. figs. 4–4a.

The anterior horn varies much as to its upward projection. My figure shows it globular at the tip with a smaller hinder tooth; the dorsal horn is fungoid in shape;

its colour is more ochreous in shade than that shown in Fowler's plate. It is figured by Westwood as a Centrotus in Duncan's "Nat. Lib. Entom.," i. t. 25, fig. 3.

Size, 8 × 9 mm.

Habitat.—Bugaba.

From Hope Collection.

0SPHONGOPHORUS (LOBOCLADISCA) DORSALIS, n.s.

(Plate XIV. fig. 6, 6a.)

This species has the posterior dorsal horn much longer than the anterior; the colour ochreous, very rugose, and studded with small spines; the tegmina fulvous-brown, with a short white bar across the disc; pronotal apex cleft. This species recalls to mind 0*S. guerini* of Fairmaire, but nevertheless it seems to be distinct. The allied species vary so much, that some would perhaps erect new genera out of them.

Size, 8 × 9 mm.

Habitat.—Bolivia.

The example of *S. guerini* given in the B.C.A., taken on January 7, shows the anterior horn nearly straight, and it omits the white fascia on the tegmina; the whole insect is also much paler.

0SPHONGOPHORUS PARVULUS, n.s.

(Plate XV. fig. 1.)

General colour pale ochreous; procephalon rising convexly from the frons, and curved backwards at about one-third from the apex, which ends in a bulb; a small pedunculated tubercle on the hind side of the procephalic horn; a considerable bulb, surmounted by a smaller one, occurs about the middle of the dorsum; the posterior end of pronotum truncate and cleft; legs reddish, the two first tibiæ dilated; the whole pronotum very hirsute and fulvous; tegmina pale and faintly corrugated.

This is a small species. My figure is from the Hope Collection (Bates), 1861.

Size, 5 × 6 mm.

Habitat.—Amazons.

0SPHONGOPHORUS INTERMEDIUS, n.s.

(Plate XV. fig. 2, 2a.)

General colour dark sienna-brown, with a violet glance or sheen over the whole; pronotum with a long, erect, unclubbed procephalic horn, which is cleft at the tip and has an inner tooth; dorsal process rugose, pointed, but not bulbose; pronotal extremity truncated and reaching nearly to the tips of the tegmina; these last are corrugated and ferruginous-brown; by the front aspect two blunt supra-humeral processes are seen, which show an approximation to similar eminences in the Hoplophoridæ.

Size, 7 × 9 mm.

Habitat.—St. Vincent, West Indies.

Drawn from a single specimen in the Hope Collection at Oxford.

O SPHONGOPHORUS (ACANTHONOTUS) LIVIDUS, n.s.

(Plate XV. fig. 3.)

General colour light sordid ochreous. Procephalon erect, broad, flat, fusiform, and punctate, furnished with a finger-like process on the hinder edge; dorsal horn acute, similar in form, and as long as the anterior process; whole insect very hirsute; tegmina ochreous; legs the same colour and punctate; hind pair not spatulate; abdomen grey.

The peculiar form of the pronotum furnishes, if not a generic separation, at least certain characters suitable for a sub-genus.

Size, 8 × 8 mm.

Habitat.—Amazons.

Hope Collection (Bates).

O SPHONGOPHORUS (LECYTHIFERA) INFLATUS, Fowler.

(Plate XV. figs. 4, 4a, 4b.)

O *Lecythifera inflatus*, Fowler, Tab. III. fig. 5 to 5c, p. 30.

Remarkable from the large inflated process on the dorsal part of the pronotum; brownish-black, with the anterior process recurved and clavate; both this and the inflated bladderlike process are sculptured and coarsely reticulated, the interstices being more or less hexagonal in form; the dorsal process is slightly sessile; the pronotal apex projects; tegmina long and brown, with a testaceous mark; legs ferruginous.

Fowler says the sexes of this species do not differ in any marked degree.

Size, 11 × 9 mm.

Habitat.—Guatemala.

Figured from Canon Fowler's Collection, by permission.

O SPHONGOPHORUS (CLADONOTA) LATIFRONS, Stål.

(Plate XV. fig. 5.)

O *Cladonota latifrons*, Stål. Öfv. Kongl. Vet. Akad. Fowl. l.c. Tab. III. fig. 6, p. 30. Förb. xxvi. p. 274.

The males of this species differ from the females as to the forms of the pronotal horns. My figure is taken from a specimen kindly lent by Canon Fowler. Warm ochreous and coarsely blotched with fulvous punctures; the procephalon is hardly longer than the dorsal process behind it, and appears as if truncate; tegmina brown, with strong venation; front legs ochreous, and barred with red.

Size, 9 × 8 mm.

Habitat.—Mexico, Acapulco, Guatemala.

SPHONGOPHORUS INELEGANS, n.s.

(Plate XV. fig. 6.)

Large, robust, grey-black, rugose, not shining, with a broad erect stout procephalic horn, and an upright dorsal process on the dorsal part of the pronotum, slightly dilated at the top; tegmina obscure sienna-brown; tibiæ, particularly the first and second pairs, broadly spatulate, somewhat hairy, and ochreous-brown; head broad with black eyes; part of the tegmina warm ochreous.

This uncouth-looking insect has some resemblance to that last described. The figure is drawn from a single example in the Hope Collection. It has much the appearance of a fragment of bark.

Size, 10 × 10 mm.

Habitat.—Mexico.

"Geale."

The following species have not come under the author's observation:

GENUS: LOBOCLADISCA, Stål.

Öfv. Vet. Akad. 26, p. 275.

Lobocladisca clavaria, Fairm.
    Sphongophorus clavaria, Fairm. l.c. p. 201. Brazil.
Lobocladisca bennetii, Kirby.
    Centrotus bennetii, Mag. Nat. Hist. p. 20, fig. 5.
    Sphongophorus bennetii, Fairm. l.c. plate iv. fig. 7. Colombia.
Lobocladisca guerinii, Fairm.
    Sphongophorus guerinii, Fairm. l.c. p. 262, plate iv. fig. 1. Panama, Brazil.
    Sphongophorus spatulatus, Fairm. l.c. p. 262, plate iv. fig. 3. Province des Mines, Brazil.
Lobocladisca bivexillifer, Costa, Ann. Mus. Nap. ii. p. 150, t. 1, fig. 11 (1865).
Lobocladisca rigidus, Stål. l.c. p. 275. Bogota.
Lobocladisca lobulatus, Stål. l.c. p. 275. Bogota.
Lobocladisca vexillifera, Goding, Canad. Ent. 25, p. 83 (1893). St. Vincent, West Ind.

CLADONOTA, Stål.

Cladonota ridiculus, Walk. Ins. Saund. p. 64. Amazons.
Cladonota mirabilis, Fairm. l.c. p. 261, plate iv. fig. 5. Brazil.
Cladonota undulatus, Walk. l.c. p. 498.
Cladonota acetus, Walk. l.c. p. 64. Para.

6 *Cladonota falleni*, Stål. l.c. iii. p. 24. Rio Janeiro.
O *Cladonota albofasciata*, Goding, Canad. Ent. 25, p. 54. St. Vincent.
6 *Cladonota ludicrus*, Walk. l.c. p. 63. Para.

II.—HOPLOPHORINÆ.

The foregoing and first section of the Membracidæ, though very diverse of form, is characterised chiefly by the spatulate character of the anterior and intermediate pairs of tibiæ. The second and present section shows the tibiæ plain, with the posterior tarsi very short, much shorter than those of the anterior and intermediate pairs.

The Tegmina (wings, according to Fowler) show either four or three apical cells.

4 Apicals.—*Triquetra*, Fairm. *Ochropelta*, Stål. *Potnia*, Stål. *Aconophoroides*, Fowler.
3 Apicals.—*Platycotis*, Stål. *Orthoplophora*, Fowl. *Hoplophora*, Germ. *Umbonia*, Burm.

Though, perhaps, not so varied in their general aspect as in the last section, the pronota take some extreme shapes, which are not always sustained in the different sexes, the males being sometimes exceptionally furnished with greatly developed procephalic horns, as in the genus Umbonia. However, in this particular there is much variety, some males being, even in the same species, much smaller and more brightly coloured than in others.

The group is not a very large one, but some remarkable insects are included in it.

About seventy species have been named by Stål and other authors, and new genera added by them. The subjoined list has been collated with the kind assistance of Mr. W. F. Kirby. Some of these species are very difficult to verify without the aid of figures. In a general way they may be thus numerically shown :—

HOPLOPHORINÆ.

Umbonia, Burm., 10 species.
Triquetra, Fairm., 12 species.
Potnia, Stål., 5 species.
Enchotype, Stål., 5 species.
Platycotis, Stål., 10 species.
Lophopelta, Stål., 3 species.
Hoplophora, Germar, 15 species.
Microschema, Stål., 5 species.
Orthoplophora, Fowl., 1 species.
Aconophoroides, Fowl., 1 species.
Ochropepla, Stål., 6 species.

Genus: UMBONIA. Burm. Fairm. Fowler.

Burm. Handl. Ent. II. p. 138 (1835).

Characters like those of Hoplophora, but modified; pronotum as long as the abdomen, sometimes extending to the tips of the tegmina; dorsum with a sharp and more or less recurved horn; which is in some males clavate or truncate at the tip; supra-humeral processes obvious, but less acute and shorter than in Triquetra; the sides not so tectiform; tegmina with three (Fowler says four) apical areas.

The characters of this and the next genus are mixed and difficult to diagnose. The wing-venation is obscure. The pronotal appendages appear to be more acute in some species than in others, and some male insects have the procephalon so modified that Amyot and Serville, Walker, and Griffini, have described them under the genus Physoplia.

Fairmaire practically divides Umbonia into three sections:

1. Horn compressed perpendicularly. *U. gladius, U. turrita.*
2. Horn turned backwards, almost horizontally. *U. reclinata.*
3. Horn not compressed, almost straight. *U. spinosa, U. orizimbo, U. pyramidalis, U. amazili, U. signoreti, U. ataliba.*

UMBONIA NIGRATA, Amyot.

(Plate XVI. fig. 1.)

Physoplia nigrata, Am. et Serv. l.c. p. 543 (1843). Fairm. l.c. p. 275, plate vi. fig. 6. *Umbonia orozimbo*, ♂.

Small; general colour dark brown, almost black, with a buff punctured triangular patch rising from the lower margin of the pronotum and continued to the carina at the side of the pronotal process; this horn is knobbed and reflected backwards. Another buff patch is seen nearer the posterior end; tegmina black with shining radial nervures; legs slender and brownish; abdomen ringed with ferruginous.

This specimen from the Fowler Collection is a male, and it is drawn as the reputed male of *U. orozimbo*, and under the same amplification as *U. crassicornis*, which also is a male.

N.B.—The red streak is here wanting, though usually present as noted by Fairmaire.

Size without the horn, 13 × 5 mm.

Habitat.—Mexico, Brazil.

UMBONIA CRASSICORNIS, Am. et Serv.

(Plate XVI. fig. 2.)

Amyot, l.c. p. 543, t. 10. Fairm. l.c. p. 275, male of *U. orozimbo. Physoplia crassicornis*, Amy. and Ser. *Umbonia orozimbo*, Fowl.

Fowler considers this insect and that named by Amyot *U. nigrata* are simply variable forms of the males of *U. orozimbo*; and certainly if the forms of the pronota be ignored, it will be difficult to avoid this conclusion, which has been arrived at, he says, by the comparison of more than 400 specimens. A rule may be proved, it is said, by its exceptions, and this insect would appear to exampled by it. The form of the pronotum is one of the chief characteristics of the Membracidæ; yet, here, as in other cases, the extraordinary development of the dorsal process makes this rule nugatory. The variations of *U. orozimbo* are chiefly restricted to the male insects. The figure given is a male from the British National Collection, and is reported from Mexico.

Expanse, 28 mm.

Size, 9 mm. Height, 15 mm.

UMBONIA MEDIA, Walk.

(Plate XVI. figs. 3, 3a.)

Walker, *Physoplia media*, l.c. p. 516.

Colour green or yellowish-green; pronotal horn very broad, flat on the top, and cut off at an angle; a red stripe extends from the hinder point of the horn to the dorsum. Pronotal surface punctured; legs reddish; tegmina with pale neuration in high relief of the membrane.

According to Stål this insect is the male of *U. orozimbo*.

Size, 12 × 14 mm.

Habitat.—Mexico.

B.M. Collection.

UMBONIA OROZIMBO, Fairm.

Fairm. l.c. p. 277, plate vi. fig. 2. Fowler, B.C.A. p. 36, Tab. III. figs. 15 to 20a.

Canon Fowler remarks that this is an extraordinary variable species, and that a right idea can be formed of it only after a careful examination of a long series. The females vary in size, in colour, and in the form of the great dorsal horn, but these variations are much more pronounced in the males of the species. The contrast between the sexes are such as led Amyot and Serville to represent the dark males with their greatly developed dorsal horns as members of a new genus, Physoplia. Fowler examined numerous examples, and in every case these enormous horns proved to be the developments of male insects. Thus Physoplia no longer should exist as a genus of Membracidæ.

But the males also differ amongst themselves as to size. Those inhabiting El Reposo and Tolé in Panama are small, and show but little difference of form from the females of that locality, whilst *Physoplia nigrata* (Amyot) and *P. crassicornis* of Florida and Brazil are large, and have a totally different aspect from the females represented by *U. orozimbo*. These latter insects are common in North and Central America.

Stål identifies *P. intermedia* of Walker as the male of *U. orozimbo*, and here he remarks, "I have never seen the females of the insects grouped under Physoplia."

Mr. W. F. Kirby, who has rendered to me much valuable assistance in arranging the synonomy of the family Membracidæ, is inclined to unite several insects, generally considered to be distinct species, under the single species *U. orozimbo*. He treats the rest as varieties. Thus we have *U. picta*, *U. decorata*, *U. peraceæ*, *U. camerani* treated as varieties, whilst *P. nigrata*, *P. crassicornis*, *P. intermedia* are considered, on good grounds, to be the males of *U. orozimbo*.

Observations of these insects, made in their living conditions, perhaps can only truly arrange and group the sexes of each species. It can scarcely be satisfactorily done by a review of a series, however large, which has been formed from localities widely apart, and under different climatal surroundings.

UMBONIA OROZIMBO.

(Plate XVI. figs. 1 to 4, and 4a.)

Supra-laterals very blunt, or none; generally a red streak runs down the centre of the dorsal horn, and another red streak from the frons rises up the anterior edge of the same; the horn is very variable in shape, sometimes being much developed and truncated at the apex, as in the males, instead of sharp, as usually seen in the females. The colours vary from bright green to testaceous or fuscous; commonly the dorsal horn is variegated with red or else brown streaks; the tegmina have long apical cellules, and the membranes are more or less transparent in texture.

The cause of the above remarkable and special development of the males of Umbonia is most obscure. It has been argued that they have become more ornate than the females, because such modifications suit the æsthetic tastes of the latter. Yet sometimes the females of insects are the most ornate, in which cases the males usually are found to be plain and uniform in colour. Here the disputants would seem to belong to two camps, and their arguments tend to destroy each other.

This is not the opportunity for discussing the elements of beauty in insect appreciation, but we may doubt if the *vera causa* has yet been found in this direction.

UMBONIA PICTA, Walk.

(Plate XVI. figs. 5, 5a, 5b.)

Walk. List. Homop. insect, Suppl. p. 130.

U. orozimbo is so variable in form that opinion may vary as to the specific values of certain examples. I include the above, on Walker's authority, although the insect here figured only nearly approaches his type now preserved in the National Collection.

Pronotum bright green, roughly punctured; dorsal horn erect, acute, and slightly recurved; one central and three orange-coloured streaks on each side; pronotal posterior apex extending to the tips of the tegmina; tegmina greenish-grey, with lighter neuration; legs brownish grey; supra-humerals short.

Size, 14 × 13 mm.

Habitat.—Mexico.

UMBONIA SPINOSA, Fabr.

(Plate XVI. fig. 6.)

Membracis spinosa Syst. Ent. p. 675, 2, 4. Sulz. Gesch. Ins. t. 9, fig. 6 (1776). *Hoplophora*, Germ. l.c. p. 243 (1835). *Umbonia spinosa*, Fowler, l.c. p. 35. *La cigale armée*, Stoll. p. 83, t. 21, fig. 116. Stål. Vet. Akad. Handl. (2), 8, (1), p. 35 (1869). *Membracis armata*, Oliv. Ent. Méth. vii. p. 668. *Umbonia spinosa*, Walk. l.c. p. 519. *Umbonia spinosa*, Fairm. l.c. p. 277.

This fine insect does not seem to be common in Central America.

Colour fine ochreous yellow, punctured, with one or more pronounced red streaks from the top of the dorsal horn to the procephalon; the base of this sharp thornlike pronotal horn extends beyond the tips of the tegmina. Though the abdomen of the female is robust, it is covered by the pronotum; the tegmina are subhyaline, with a fine neuration dividing the membranes into elongated cellules; supra-humerals are more conspicuous from the dorsal than from the frontal aspect; legs stout; hind tarsi short; tibiæ often with a red longitudinal streak. There is much variation in the intensity of the red streaks.

In the National Collection there is a specimen with dark tips to the wings,

Expanse, 33 mm.

Size, 15 × 12 mm.

Habitat.—From Guatemala to Brazil.

UMBONIA JAVANENSIS, n.s.

(Plate XVII. fig. 1.)

This insect at first sight might be thought to be a large example of *U. spinosa*, but apart from its greater size, it has several other differences.

The pronotum is deeply punctured, and also striated all over its surface; its colour is more rufous and glaucous, with the point of the dorsal recurved process black; the tegmina are shining and much darker than in *U. spinosa;* the abdomen is large, and slaty grey. As in other species of this genus, the hind tarsi are very short; the first and second pairs of legs are the longest.

U. orozimbo also is different, and is an American species.

Size, 17 × 11 mm.

Habitat.—Java.

Wollaston Collection.

UMBONIA RECLINATA, Germ.

(Plate XVII. fig. 2.)

Germ. *Hoplophora reclinata* Silb. Rev. Ent. iii. p. 243 (1835). *Umbonia reclinata*, Fairm. l.c. p. 276, t. 1, fig. 3. Fowler, l.c. p. 34, Tab. III. figs. 12, 12a, 12b. Walk. *Umbonia multiformis*, l.c. Suppl. p. 129. Stål. *Umbonia funestra*, Öfv. Vet. Akad. p. 249.

Large; general colour brick-red, with a yellow stripe proceeding from the humeral process to the apex of the dorsal horn; another dusky yellow streak runs from the frons to the same apex, and also a central streak divided by a fine line; tegmina grey; legs dusky red, the front pair the smallest, rather flattened.

This striking insect is variable in colour. The male, as figured in the B.C.A., is smaller, and green.

Size, 15 × 10 mm.

Habitat.—Chilpancingo, 4600 feet; Costa Rica.

UMBONIA PYRAMIDALIS, Fairm.

(Plate XVII. figs. 3, 3a, 3b.)

Fairmaire, l.c. p. 277. Fowler, l.c. p. 35.

The chief characteristics of this species are the robust and compact form of the pronotum, and the shortness of the abdomen; the dorsal horn rises triangularly from the basal line of the pronotum; it has five red streaks down the edges of each of the six carinations; pronotum of a dirty green colour, deeply punctured, with two obscure yellowish bands or blotches on each side; suprahumerals moderately long, and best seen from the front aspect; tegmina reddish-brown; middle tibiæ each with a red stripe.

Drawn from a female insect in the British Museum Collection, but not in good condition.

Size, 14 × 12 mm.

Habitat.—Mexico, Oaxaca, Brazil.

UMBONIA SUBCLIVATA, n.s.

(Plate XVII. fig. 4.)

Large; colour brick-red, coarsely blotched with brown; dorsal horn moderately elevated, slightly recurved and acute; tegmina long, obscure greyish-green; legs ferruginous, with rather strong grey tarsal joints.

Has some resemblance to *U. reclinata*, and as the figure is that of a female, it is possible that it may prove to belong to that species.

The chief differences consist in *U. clavata* having its pronotum less elevated, and the absence of all the characteristic yellow markings.

Size, 16 × 10 mm.

B.M. Collection.

UMBONIA ATALIBA, Fairm.

(Plate XVII. figs. 5, 5a.)

Fairm. l.c. p. 278, t. 6, fig. 1. Fowler, l.c. p. 35, t. 3, figs. 11, 11a. Walker, *Umbonia lativitta*, l.c. ii. p. 520.

Fairmaire gives the description—yellow, with a medial and two red bands, one on each side; pronotal horn set rather behind the shoulders, the processes black; tegmina subhyaline "enfumées à l'extrémité."

Two examples are in the Hope Collection, one of which I figure. They recall *U. spinosa*, which, however, is usually a much larger insect, and has the red streaks less marked.

Size, 15 × 10 mm.

Habitat.—North America, South and Central America.

UMBONIA GLADIUS, Fairm.

(Plate XVII. fig. 6.)

Fairm. plate vi. figs. 4 and 5, p. 275. Fowler, B.C.A. Tab. III. fig. 13, p. 38.

Pronotum with an erect, thin, flat and perpendicular dorsal horn; colour ochreous, with coarse punctures; the males show a red streak on each side of this horn, which is nearly obsolete in the females; this process is carinated and tipped with black; legs short and hirsute. The females appear to be more plentiful than the other sex, but examples are not common.

The species recalls Platycotis or Enchenotype of Stål; but with reference to the former genus the horn is not directed forwards, and the space between the shoulders is wider.

Size, 11 × 8 mm.

Habitat.—Valladolid, Yucatan, Campeachy.

UMBONIA ARTICULARIA, n.s.

(Plate XVII. figs. 7–8.)

Colour dark ochreous, with a rosy tint, shining and finely punctured; pronotal horn erect, sharp, and compressed; immaculate; tegmina hyaline, with yellow neuration, rather fuscous; legs short, stout "gouty legged"; females stouter than the males.

This species recalls *U. apicalis* of Walker, but it shows no spots on the metopidium or sides of the pronotum ; suprahumerals with black tips.

Expanse, 22 mm.

Size, 11 × 9 mm.

Habitat.—Belize, Honduras.

Heine Collection.

UMBONIA RECTISPINA, Stål.

Öfv. Vet. Akad. Tab. xxvi. p. 265 (1869); (variety of *U. orozimbo*).

Habitat.—Bogota.

UMBONIA ORIZABÆ, Fowler.

Fowler, l.c. p. 37, Tab. III. figs. 21, 21a, 22.

Canon Fowler thinks that these insects possibly are a peculiar race of *U. orozimbo*, some of the small males of which last closely resemble it. It is a small species, with a similarity between the horns of both sexes ; these horns are short, sharp, and strongly recurved ; colour olivaceous, with the front of the metopidium, the tip of horn, and the dorsal line, red.

Size, 11 mm.

Habitat.—Orizaba, Mexico.

UMBONIA SIGNORETI.

Fairm. l.c. p. 278, plate vi. fig. 6.

Yellow ; posteriorly elongated, four lined.

Size, 15 mm.

Habitat.—Colombia.

UMBONIA REDUCTA.

Walk. l.c. ii. p. 520. B.M. collection.

Habitat.—Para.

UMBONIA TERRIBILIS.

Walk. l.c. Ins. Saund. Homop. p. 66.

Habitat.—Colombia.

UMBONIA AMAZILI.

Fairm. l.c. p. 277.

Size, 12 mm.

Shining pale yellow, with a middle red line.

Habitat.—North America.

UMBONIA DECORATA.

Walk. l.c. Suppl. p. 130 ; var. of *U. orozimbo*.

UMBONIA PERACEA.

Perhaps is the ♂ of *U. orozimbo.* *Physoplia peracea*, Griffini, p. 3. Bull. dei Mus. cl. Zool. ed. Anat. de Torino (1895).

Probably this insect is one of the male forms of *U. orozimbo.*

UMBONIA CAMERANI.

Griffini, l.c. p. 3 (1895).

It may be noted that Fowler considers *U. funesta* and *U. multiformis* (Walker) to be the same as *U. reclinata;* that *U. reducta* (Walker) is *U. pyramidacis* of Fairmaire, and that *U. picta* and *U. decorata* are varieties of *U. orozimbo.*

GENUS: TRIQUETRA, Fairmaire.

Ann. Soc. Ent. France, p. 279. Fowler, B.C.A. p. 32.

The species of this genus are somewhat important. They mostly inhabit Bogota, Venezuela, and Brazil. They are often large insects, showing a tectiform pronotum, furnished with a large dorsal horn of more or less apical acuteness. The suprahumeral processes are more developed than in Umbonia, and the tegmina have at least four apical areas.

Like Umbonia, they crowd round the stems of the plants they affect, the colour of which they simulate, and doubtless from their thorny aspects they can protect themselves from the rough treatment of foes. Living forms are brighter and greener than those found in our museums, but for the present their colours must be imitated from the dry materials at hand until the field naturalist will better instruct us.

The aspect or facies of the species differ, and Fairmaire's group may be broken into what may be called sub-genera, such as Stål has done.

Triquetra grossa, *T. virescens*, and *T. virgata* may be regarded as typical species. *T. turrita*, *T. obscura*, and *T. reruta* may be partially separated. *T. nigrocarinata*, *T. bos*, and *T. obtusa* are all more or less tent-like on the dorsum, and may be relegated to the genus Microschema of Stål.

TRIQUETRA GROSSA, Fairm. p. 280, l.c.

(Plate XVIII. figs. 1, 2, 2a.)

Walk. l.c. p. 522.

Large; bright yellow, punctured with fulvous; pronotum with a strong thorn-like horn between the two sharp suprahumeral processes, which are perpendicularly compressed; frons fuscous; tegmina hyaline, with yellow neuration; hind tarsi short.

Size, 14 × 9 mm.

Habitat.—Cerrozunil, 5000 feet elevation; Venezuela, Ecuador, Colombia, Costa Rica, Chiriqui.

Own Collection.

TRIQUETRA SUBMACULATA, n.s.

(Plate XVIII. figs. 3, 3a, 3b.)

Ochreous yellow, much punctured; pronotum with an erect wide but compressed dorsal horn, with no black edge; suprahumerals rather blunt, and directed forwards and downwards; an obscure brown patch occurs above the metopidium, and two smaller brown stains on each side of the pronotum; tegmina grey; legs ochreous yellow.

Size, 10 × 8 mm.

Habitat.—Ecuador.

This species has some resemblance to *T. apicalis* of Walker, but his insect has the lateral spines very slender and black; neither does it well agree with Fowler's description of *T. apicalis*.

MICROSCHEMA NIGRO STRIGATA, n.s.

(Plate XVIII. figs. 4, 4a.)

Fine yellow colour; pronotum with a short but sharp dorsal horn, which is broadly black at the fore and hind edges, the black stripes being carried round the frons and nearly to the apex of the pronotum, which is as long as the tegmina. The pronotum is deeply grooved and punctured horizontally; tegmina fuscous-yellow.

Size, 9 × 5 mm.

Habitat.—Quito.

Rossenburg Collection.

This insect, except from size and habitat, almost agrees with *T. nigrocarinata* (Fairm.) of Bogota.

MICROSCHEMA OBTUSA, n.s.

(Plate XVIII. figs. 5, 5a.)

Triquetra bos? Fairm. l.c. p. 282.

Slim; pronotum punctured, rising direct, and slanting from the metopidium to the centre of the dorsal ridge, and thence falling straight to the posterior apex, thus forming an elevated tent-like angular hump; tegmina long and hyaline; suprahumerals brown, with distinct carinæ; tips of the horns slightly recurved; underside fuscous; frons wide and transversely narrow; legs yellow.

Size, 11 × 5 mm.

Habitat.—Bogota.

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O MICROSCHEMA INERMIS, Fairm.

(Plate XVIII. figs. 6, 6a, 6b.)

O *Triquetra inermis*, Fairm. l.c. p. 280.

Clear yellow, sparsely punctured; pronotum without either a cephalic or dorsal horn; a strong black streak down the centre; edges of pronotum also dark; tegmina with long radials, the areas of which are cut up by faint transverse nervures; legs slender; suprahumeral horns divergent and rather short; often a dark spot occurs above the legs.

Size, 13 × 6 mm. ✓

Habitat.—Bolivia.

O MICROSCHEMA BOS.

O *Triquetra bos*, Fairm. l.c. p. 282.

Large; shining, much punctured; colour ochreous-yellow, probably greener in life. Pronotum raised perpendicularly from the frons and thence forming an obtuse angle on the dorsum and descending to the apex, rather short of the tips of the tegmina; lower margin carinated; supra-humerals by front view seen as two stout divergent horns; there is no dorsal spine; tegmina with yellow transverse nervures enclosing areas not cycloidal in form. This character separates the present genus from Ceresa, with which it might be confounded. Legs rather stout. Tegmina more or less crinkled, and catching the light in patches.

Size, 13 × 7 mm.

Habitat.—Bogota.

Although my description is taken from a considerably larger insect than that given by Fairmaire, it will be well to mark this character of size only as a variation from the normal species.

The collection in the British Museum may be consulted for the following species, which are not included in this Monograph:

O *Triquetra virescens*, Fairm. l.c. p. 281. Venezuela.
O *T. ustulata*, Fairm. l.c. p. 281.
O *T. truncaticornis*, Germ. l.c. p. 244. Brazil.
O *T. obscura*, Walk. (Umbonia) l.c. p. 517.

TRIQUETRA INSIPIDA, n.s.

(Plate XIX. figs. 1, 1a.)

Colour concolorous, dingy-brown with a reddish shade; coarsely punctured and blotched with darker stains. Supra-humerals acute, divergent, and directed forwards. Metopidium perpendicular, with an obscure darker patch between the horns; dorsal horn erect, but the point directed rather forwards; two small obscure brown spots occur just above the lower marginal edge of the pronotum; tegmina with dark membranes and yellow prominent nervures; legs dusky.

My figure is from an insect grouped with others in the Hope Collection which is labelled "very near *T. verula*," yet it is doubtful if it really belongs to that species. Provisionally the above name is given to it.

Size, 12 × 7 mm.

GENUS: HOPLOPHORA.

Germ. Burm. Amyot et Serv; Fairm. l.c. p. 269 (1846); Fowler, l.c. p. 38 (1894).

This genus comprises certain insects, furnished with short and broad pronota, which are scutiform; that is, the sides are nearly parallel for a certain distance, and then narrow to a sharp point to the lower apex. This scarcely reaches to the end of the body. The supra-humeral processes are short and blunt, with no dorsal horn as seen in *Umbonia.*

Head narrow; the tegmina longer than the pronotum, and furnished with more or less oblong areas bounded by thick nervures; the membranes are free and transparent; legs prismatic; the hind tarsi are much shorter than the others; body sometimes hairy.

Those insects which were comprised in Fairmaire's genus Hoplophora, and are furnished with procephalic horns, are now merged into Platycotis and the allied genera.

HOPLOPHORA SANGUINOSA.

(Plate XIX. figs. 3, 3a.)

Fairm. l.c. p. 270; Walk. l.c. p. 511.

Pronotum viewed from the back flat and scutiform with a marginal carina. Abdomen brown, large and ringed, with the last three segments ochreous-yellow; the whole body and the legs finely hirsute; colour of the pronotum pinkish-red, with a black streak from the metopidium which runs backwards to the apex; fore part ochreous.

Scutellum covered, though the pronotum is free and short; tegmina clouded; hyaline and fulvous at their bases; neuration strong, brown at the apical parts; legs stout, pilose, and banded with brown; eyes prominent.

This handsome species remarkably resembles a small bumble-bee in form, which it might be thought to mimic.

Though treated as a synonym of the next species to be described, ✓*H. sanguinosa* is ranged separately in the National Collection, and therefore I figure it with a caution.

O HOPLOPHORA MONOGRAMMA.

(Plate XIX. figs. 4, 4a, 4b, 4c.)

O*H. sanguinosa*, Fowler, l.c. p. 38; ✓*H. monogramma*, Fowler, l.c. p. 38;
✓*H. monogramma*, Germ. l.c. p. 242.

Pronotum bright ochreous-red, shining, thickly punctured; with a single dark brown carina reaching from the base of the head to the middle of the dorsum; pronotum seen from the back shield-shaped, with two small supra-humeral angles; eyes prominent; head rather broad; tegmina transparent ashy-grey, with marked brown neuration; yellowish near the costa, and with some dark spots and stainings; legs bright yellow; second pair longer, banded with brown, hirsute, and with long black tarsi; third pair with smaller tarsi.

Size, 12 × 5 mm.

Habitat.—Mexico, Bogota.

Hope Collection.

Canon Fowler remarks that this species is very variable both as to size and colour. It occurs under at least three forms—brown, yellow, and reddish, which last he says is clearly that described by Fairmaire under the name ✓*Sanguinosa*, and is marked by a black streak on the red pronotum.

There are several specimens in the Hope collection labelled ✓*H. monogramma*, Germ. They are larger and more dusky coloured than ✓*H. sanguinosa* of my figure, but in general characters they otherwise agree with it.

Expanse of wing, 20 × 8 mm. Size of body, 11 × 5 mm.

This species and its varieties does not appear to be rare.

Habitat.—Mexico, Talasco.

July.

Schumann's Collection.

Fig. 4*a* represents a form which may be called O*H. apiformis* var. The marginal edge of the pronotum is sinuous. The colour ochreous, covered with reddish spots, and with a red streak following the margin thereof. Abdomen broad, concave below, deeply ringed above with pale grey edges. Tegmina with three brown spots on the membrane. The smooth pronotum without keels distinguishes this insect from 6 *H. disparipes.*

HOPLOPHORA PUBESCENS, n.s.

(Plate XIX. figs. 5, 5a.)

Large; general colour dark ferruginous; deeply punctate. Pronotum with a red carinal border running from between the obtuse supra-humeral processes to the posterior point. Whole pronotum deeply pitted with brown. Tegmina hyaline with reddish-yellow neuration. In some specimens like that figured there is considerable difference in the development of the right and left alary organs. Tarsi longest in the first pair of legs, decreasing in length from the second to the third pair, which last are very small. Whole insect finely pilose, and particularly so on the underside. There are numerous examples in the Hope Collection, all of which are concolorous.

Size, 13 × 6 mm.

Habitat.—Bogota.

Hope Collection.

HOPLOPHORA PERTUSA, Germ. Ann. Serv.

(Plate XX. figs. 1, 1a, 1b.)

Fairm. l.c. p. 271.

Pronotum yellow, much punctured; on the anterior part two dark brown points. Dorsum gibbous; side borders red; dorsal edge but little developed; tegmina hyaline with reddish nervures; supra-humerals mere rounded eminences; abdominal rings uncovered, but the scutellum is concealed; legs short with relatively large tarsi; femora thick and marked by dusky bands, more or less hirsute.

Size, 12 × 5 mm.

Habitat.—Brazil.

HOPLOPHORA POROSA.

(Plate XX. figs. 2, 2a.)

Walk. *H. porosa*, l.c. p. 513; *H. pertusa* var. (?).

I have not been able to compare Fairmaire's type specimens with others in the British Museum, but I am much of the opinion that Walker's ✓ *H. porosa* is only a variety of *H. pertusa.*

One characteristic of *porosa* is the high and convex dorsal ridges and the comparatively short pronotum. The figure is added for comparison, and is drawn from one out of several examples in the National Collection.

In the figure drawn the tegmina show brown nervures instead of the more correct normal brick-red veins.

LARVA AND PUPA OF HOPLOPHORA PERTUSA.

(Plate XX. fig. 3; Plate XIX. fig. 6.)

Few naturalists can venture to predicate the form that any species of a comparatively unknown family of Arthropoda may assume in its early metamorphoses. The conditions are too varied and complex. As somewhat analogous examples, we may note how great is the divergence of form shown by the naupilius of the common lobster, from the animal in its adult or imaginal condition ; or as shown by the pluteus whilst developing into the echinus ; or again, more remotely by the tadpole passing into the newt. No one would, *à priori*, guess that the caterpillar foreshadowed the butterfly. Such unexpected facts may well caution us against hasty guesses in assigning some of the curious pupal and larval insects sometimes found in cabinets to particular species of Membracidæ, though these immature forms clearly belong to this family of Homoptera.

The metamorphic external changes of the Hemiptera Homoptera probably are not so remarkable as those to be noted in some other insect orders. Yet they show occasionally some interesting and unlooked-for peculiarities.

We have before described some of these peculiarities in the genus Membracis. As the pupæ are not quiescent like the chrysalides of Lepidoptera, but are active in leaping from bush to bush, we do not, so far as observation now goes, remark great anomalies or departures from usual types.

The larvæ of some of the Darninæ will be discussed farther on, but here it will be convenient to notice the pupal forms of a species of Hoplophora closely allied to *H. pertusa*, even if not afterwards proved to belong to that identical species.

The larva is ochreous-yellow or greenish, spotted with brown, with the pronotum much less developed than in the pupa. It forms a kind of hood over the head, leaving the rudiments of the scutellum uncovered to view; the sheaths of the incipient tegmina are small and brownish in colour, and the abdominal rings develop small flaps at their edges; the hind tarsi certainly are not shorter than the intermediate pair, as may be noted in the adult insect.

Size, 7 × 5 mm.

THE PUPA. (Plate XIX. fig. 6.)

The pronotum is more developed than in the larval condition, and is carried farther over the scutellum, which exhibits two long spines. These are not to be found in the imago state; the abdomen is more attenuated; the tegmina are membranaceous, weak, and partially elaborated; legs stout and clumsy; indeed, the whole form is somewhat uncouth and grotesque.

Size, 6 × 5 mm.

There are ten specimens of these pupæ in the Hope Collection, grouped with *H. pertusa*. Presumably they were captured in Guyana in company with the adult insects.

OHOPLOPHORA GIGANTEA, Fairm.

(Plate XX. figs. 4, 4a.)

Fairm. l.c. p. 269.

Large; pronotum viewed from above long oval, with the apex acute and reaching to the end of the abdomen; punctured, dark brown, with a central carina and two other parallel carinæ on each side, besides the marginal carina; all of these are bright brick-red; abdomen large, black, and partially covered by the pronotum; legs stout and black, the hind femora channelled and furnished with short weak tarsi; tegmina dense olive-brown, with a coarse, raised red neuration; marginal limbi broad; apical areas four; wings delicate, with olive-grey membranes; front of the metopidium pubescent.

The insects are variable in size and in markings.

Size, 12 × 7 mm.

Habitat.—Bogota.

Expanse, 40 to 45 mm.

OHOPLOPHORA CINEREA.

(Plate XX. figs. 5, 5a.

H. cinerea, Fairm. l.c. p. 272; Fowl. l.c. Tab. III. fig. 24, p. 39.)

Pronotum broad, obtuse, with two auricular or earlike projections on the shoulders; dorsum with a single projecting carina, with three sinuous and less conspicuous carinæ on each side; colour ochreous-yellow; tegmina short, hyaline and grey. This insect is in shape unlike those before described, and only partly answers to Fairmaire's description: "Cinerea, carinatis, humeris auriculatis."—André.

Canon Fowler says that this species is very numerously represented in their collection, but it is apparently rare in other cabinets. There is but one example in the Hope Museum, which I figure.

Size, 11 × 5 mm.

Habitat.—Vera Cruz, Guatemala, Capetello (Champion).

O HOPLOPHORA VICINA, Fairm.

(Plate XX. fig. 6.)

Fairm. l.c. p. 270, Plate VI. fig. 10; O *H. porosa*, Walk. l.c. p. 513; O *H. fimbriata*, Stål. l.c. p. 25.

Greyish-yellow, finely punctured with brown dots; supra-humerals acute, short, and set at right angles to the fore part of the pronotum; pronotum scutiform; abdomen black, and pilose at the tip; head small and triangular; legs black; membrane of the tegmina smoky, with dark brown wings.

This description, however, only partly accords with Fairmaire's description: "Flavescens, punctata, non callosa" (? soft-skinned). The figure on his plate agrees well with the above.

Size, 13 × 5 mm.

Habitat.—Columbia.

Wollaston Collection.

O HOPLOPHORA DISPARIPES, Fowler.

(Plate XX. fig. 7.)

✓ *H. disparipes*, Fowl. l.c. p. 40, Tab. III. fig. 25.

Small; colour cinereous or else dingy brown, with obscurely marked dark fuscous spots or long transverse bands; pronotum rather hirsute, with one central and three or four parallel yellowish carinæ; tegmina grey, shining, with corrugated membranes.

Fowler calls attention to the comparative weakness of the hind legs and tarsi.

Size, 7 × 5 mm.

Habitat.—Geronimo, Guatemala.

Figured from a specimen lent by Canon Fowler from his private collection.

The following species have not come before my notice for figuring, but may be added for reference:

O *H. signoreti*, Fowl. l.c. p. 39, Tab. III. fig. 23. Mexico.
O *H. unicolor*, Fowl. Trans. Ent. Soc. Lond. p. 469. Colombia.
O *H. semitecta*, Walk. l.c. Suppt. p. 129. Venezuela.
O *H. obtusa*, Stål. l.c. p. 25. Rio Janeiro.
O *H. variegata*, Fairm. l.c. p. 271. Columbia.
O *H. sordida*, Germ. (Umbonia) l.c. p. 243; Fairm. l.c. p. 271. Brazil.
O *H. corrosa*, Fairm. l.c. p. 272, Plate VI. fig. 11. Bogota.
O *H. gloveri*, Goding, Bull. Illinois Lab. iii. p. 457 (1894).
O *H. triangulum*, Germ. l.c. p. 242; Fairm. l.c. p. 273. Brazil.
O *H. concinna*, Fowl l.c. p. 41, Tab. IV. fig. 1. Panama.

GENUS ?O PLATYCOTIS, Stâl.

Vet. Akad. Handl. (2) 8 (1), p. 36; Fowl. l.c. p. 41.

Differs from Hoplophora in the greater breadth of the head, and that the pronotum is not subparallel behind the shoulders, and also not shield-shaped; the feeble tarsi of the hind legs, however, are retained by all the species of the genus.

O PLATYCOTIS TUBERCULATA.

(Plate XXI. fig. 1 ♀, fig. 1a ♂, fig. 1b.)

Fairm. l.c. p. 273, Pl. VI. fig. 9; O *Hoplophora ornata* (?), Fairm. l.c. p. 274; O *Lophopelta tuberculata*, Stâl. l.c. p. 37; Fowler, B.C.A. Tab. IV. fig. 2, p. 42.

Pronotum with a blunt, flat anterior horn protruded, in an almost straight line with the dorsum. This character separates the insect from O *Umbonia gladius*, which it resembles ;general colour bright yellow, and punctured; the horn has a conspicuous red stripe on each side, two semicircular red stripes on the shoulders, and a red stripe on the marginal straight border; tip of the horn blackish; tegmina greyish-hyaline, with brown nervures; legs yellow; middle tibiæ fringed with hair; the hind tarsi very short; metopidium with three or four spots on the frons.

The male is slim and bright in colour, but it wants the anterior horn of the female; the dorsal edge, therefore, is straight and then smoothly convex; abdomen yellow, and ringed with brown.

Size, 13 × 6 mm.

Habitat.—Mexico up to 7000 feet elevation; Talapa, California.

Fairmaire thus describes *Hoplophora ornata* as a new species. "Virescens prothoracis cornu rotundato apice rubro;" but it probably is only a variety of *P. tuberculata*. The elytra "presque noires à la base, et marquées de deux taches vert pâle," perhaps is hardly sufficient for its specific separation.

The proportions of the pronotal horn are not constant in all examples, and sometimes it is entirely wanting.

O PLATYCOTIS SICULA, n.s.

(Plate XXI. figs. 2–2a.)

Dark brown in colour, very rugose and punctured; pronotal horn rather curved forwards, black with a red dash on each side; tegmina brown and rough; pronotum with the front carina broadly pitted; middle tibiæ not hirsute.

Size, 11 × 7 mm.

Habitat.—Amazons.

Wollaston Collection.

PLATYCOTIS HISTRIONICA.

Stål, *Hoplophora*, Stett. Ent. Zeit, 1864, p. 69; *Lophopelta histrionica*, Stål, l.c. p. 69.

The dorsal horn is variable in length. See Fowler, l.c. Tab. IV. fig. 5, p. 43.

PLATYCOTIS NIGRO-RUFA, Walk.

Hemiptycha nigro-rufa, Walk. l.c. Suppt. p. 143.

N.B. This species may be mixed with others in the B.M. collection.

PLATYCOTIS ACUTANGULATA, Stål.

Œfv. Vet. Akad. 26, p. 263; Fowl. l.c. p. 42.

Habitat.—Guatemala.

PLATYCOTIS BREVICORNIS.

Fowler, l.c. (Potnia), p. 46, Tab. IV. fig. 9.

Habitat.—Panama.

PLATYCOTIS SAGITTATA, Germ.

Fairm. l.c. p. 273.

Habitat.—Brazil.

Other described species are as follows:

P. vittatus, Fabr. *Centrotus vittatus.* (Hoplophora) *vittata*, Fairm. l.c. p. 271.
P. (Hoplophora) *vittata*, Stål. l.c. p. 37. Type of Platycotis (?)
P. lineata (Hoplophora), Fairm. p. 270.
P. humilis (Hoplophora), Walk. l.c. p. 514.
P. concolor, Walk. l.c. p. 171. Columbia.
P. discreta, Fowl. l.c. p. 42, Tab. IV. fig. 4. Guatemala.
P. nigromaculata. Vancouver's Island.

The scheme drawn in the Biologia Centrali Americana, considers Stål's sub-genera Microschema and Lophopelta, as comprised in the genus Platycotis. The distinctions made by Stål do not appear to be very marked. For the chief differences the student may be referred to page 41 of Fowler's Monograph in the B.C.A.

The genus Lophopelta is represented by *Platycotis histrionica* of Stål.

The following species have been described by some authors, and may be added to the list of Hoplophorinæ previously set forth in this Monograph.

GENUS: MICROSCHEMA, Stål.

Vet. Akad. Handl. p. 37, (2) 8 (1).

M. stramenicolor, l.c. p. 25 (2) III. (6) 1860. Type of the genus.
M. inermis, Fairm. l.c. (Triquetra), p. 280.
M. intermedia, Distant (Triquetra), Ent. Mon. Mag. xvii. p. 223.
M. nigrocarinata, Fairm. l.c. p. 280.
M. recurva, Stål. l.c. Öfv. Vet. Akad. p. 266.
M. spreta, Goding (Platycotis), Bull. Illinois, Tab. III. p. 456 (1893).

GENUS: OCHROPEPLA, Stål.

Öfv. Vet. Ak. Förh. xxvi. p. 268; Fowler, l.c. p. 43.

This genus differs from Platycotis partly in the neuration of the tegmina, which show only four apical areas (the upper one often is very minute), and also in the smaller dimensions of the insects. There is some variation likewise in the length ot the pronotum, which reaches considerably short of the tips of the wings.

OCHROPEPLA PALLENS, Stål.

(Plate XXI. fig. 4.)

Fowler, l.c. p. 44.

Ochreous-grey, supra-humerals blunt; pronotum much punctured with a distinct central carina; tegmina ochreous-grey, with yellow neuration.

The specimen I draw has five apical areas, but the normal number appears to be four. It is much smaller, but does not greatly differ otherwise from *Ochropepla corrosa.*

OCHROPEPLA CORROSA.

(Plate XXII. figs. 1, 1a, 1b.)

Hoplophora corrosa, Fairm. l.c. p. 272, Plate VI. fig. 11; *O. corrosa*, Fowler, B.C.A., Tab. 6, fig. 6, p. 44; *Hoplophora punctum*, Fairm. p. 272; *O. punctum*, Stål, l.c. p. 268.

Colour uniformly ochreous, with a greenish tinge, coarsely punctured; metopidium vertical, then rounded, and the dorsal ridge continued backwards to the apical point; supra-humerals blunt, with no other processes; pronotum reaches to rather more than half the length of the tegmina; these last organs are finely pilose, with obscure yellow nervures; legs stout, hirsute, with short tarsi, the hind pair the shortest; the pronotum, seen from the back, is trapezoidal.

Size, 6 × 4 mm.

Habitat.—Colombia, Panama, Bogota.

OCHROPEPLA INÆQUALIS, Stål.

(Plate XXII. fig. 2.)

Fowl. l.c. Tab. IV. fig. 8, p. 44.

Very small; colour obscure ferruginous brown, more or less mottled with ochreous sains; the dorsal edge of pronotum rather sinuous; tegmina with brown neuration. The insect I have figured is from the Hope Collection, but it rather differs from Fowler's figure. Probably it is one of the brown varieties he notes.

Size, 4 × 2 mm.

Habitat.—Chiriqui, Mexico, 4000 feet elevation.

Disparity of size in examples of almost the same genus; such as *O. disparipes* and *Hoplophora gigantea*, are striking. Inequality cannot be explained by differences of food or its abundance, neither has climate or temperature any appreciable effect in its production.

The nature of the initiative force imparted to the germ of the ovum is at present, and perhaps will always be, out of our ken.

Examples of species not here figured are:

O. hebes, Walk. (Triquetra), l.c. p. 525. Columbia.
O. dubia, Fowl. l.c. p. 45, Tab. 7. Panama.

GENUS: POTNIA, Stål.

Berl. Ent. Zeitschr. x. p. 388 (1866); Fowler, B.C.A. Homop. p. 45 (1894).

This genus comprises a few small species which are principally characterised by the pronotum being produced into a porrect and more or less extended horn, somewhat like that of Enchenopa, but showing a different neuration of the tegmina and having the posterior tarsi short, as in all the Hoplophorinæ.

Stål describes the tegmina as having four apical cells, but probably this number is not constant in all species of the genus. Enchotype of Stål has only three apical areas, and is nearly allied to Potnia.

POTNIA AFFINIS, n.s.

(Plate XXI. fig. 3 ♂, figs. 3a, 3b, 3c ♀.)

Colour of the male greyish brown, with a slight tendency to mealiness; pronotum with a flat, obtusely pointed, porrect horn; dorsal ridge somewhat sinuous and ending in a point which reaches to about half the length of the tegmina; tegmina with five distinct apical areas; legs short, yellowish, with their tarsi nearly equal in length in all the pairs; metopidium much punctured, swollen, and with two short stout suprahumeral processes.

The female is ochreous brown, with long hyaline tegmina veined with yellow; pronotum with a flat horn more dilated at the tip than is seen in the male, and marked by three carinations; surface punctured and rather mottled with brown; Dorsum unarmed, and extending posteriorly nearly to the tips of the tegmina. These last organs are narrow, and show at least four apical cells.

It is difficult exactly to decide on the neuration, as it seems to differ in the sexes. I figure the tegmina of both sexes. Though nearer to Potnia than any other genus, I somewhat doubtfully place this insect here.

Size, 9 × 5 mm. and 14 × 4 mm.

Habitat.—Bogota.

Hope Collection.

POTNIA BREVICORNIS, Fowler.

(Plate XXI. figs. 5, 5a.)

B.C.A. p. 46, Tab. IV. fig. 9.

Very small; pronotal process short and blunt as if truncated, tipped with brown; colour ochreous, blotched with brown; tegmina transparent and furnished with brown parallel nervures.

Fowler remarks that this species is very near to *Potnia asodalis* of Dr. Goding, an insect which inhabits California. My figure is from the Hope Collection with the *habitat* Volcan de Chiriqui up to 8000 feet elevation.

Size, 5 × 3 mm.

There is another insect in the Hope Collection from Bogota, which I cannot separate from that above described, except from its larger size, viz., 6 × 3 mm., and a little difference in the colour of the wing veining.

The following insects have been described by others and may be placed under Potnia:

P. venosa, Germ. (Membracis) 1821; Ent. iv. 19, 16.
Umbonia venosa, Fairm. l.c. p. 278.
P. jaculus, Stål. Vet. Akad. Handl. Fab. l.c. (2) viii. p. 38.
U. indicator, Fairm. l.c. p. 279, Plate VI. fig. 15.
P. Jansoni, Fowl. Trans. Ent. Soc. (1894), p. 418.
P. perobtusa, Fowl. l.c. (1894).
P. granadensis, Fowl. l.c. 45, Fairm. p. 273 (Hoplophora).

GENUS: ORTHOPLOPHORA.

Fowler, l.c. p. 46.

This genus has been formed to receive the single species *Orthoplophora Salvini*. It differs from Potnia, inasmuch as the tegmina show four apical areas; and from Enchotype, in having a broader head and differently shaped dorsum and horn.

ORTHOPLOPHORA SALVINI.

Fowl. Tab. IV. figs. 10. 10a.

Colour greyish ochreous; pronotum unicolorous, with two broad black bands which extend about two-thirds of the distance between the suprahumeral processes and the pronotal apex.

The straight dorsum and the black bands separate this species from both Platycotis and Aconophoroides.

Size, 13 mm.

Habitat.—Mexico, Vera Cruz.

ACONOPHOROIDES, Fowler.

Fowl. l.c. p. 47 (1894).

In general form like Aconophora, but the few species yet described, more nearly approach Potnia and Hoplophora. They have small posterior tarsi, the first and the second pairs being much the longest, and the pronota have strongly carinated edges. The neuration, however, seems to be closely related to Aconophora, and shows four apical cells in the tegmina.

ACONOPHOROIDES GLADIATOR, Walk.

Thelia gladiator, Walk. l.c. II. p. 567; Fowl. l.c. p. 48, Tab. IV. fig. 11; *Aconophora lata*, Walk. Ins. Saund. p. 69.

Ferruginous; head short; eyes prominent; procephalon porrect, ascending, red, with a black border on each side; pronotum acute and recurved at the tip, with six yellow carinæ; tegmina ferruginous; nervures very stout.

Sub-genus: ENCHOTYPE, Stål.

Stål Vet. Akad. Handl. (2) 8 (1) p. 37 (1869).

This sub-genus contains a few insects, in general form not unlike those included in Potnia, but the descriptions, according to Stål, give only three apical areas to the tegmina.

Perhaps the insect I have figured on Plate XVII. fig. 6 as an Umbonia (in which particular I have followed Canon Fowler's lead) should be better referred to the above sub-genus. Accordingly, I place it below for further reference, viz.,

ENCHOTYPE GLADIUS, Fairm.

Umbonia gladius, Fairm. l.c. p. 275, Plate VI. fig. 4; *U. gladius*, Fowl. l.c. p. 38, t. 3, fig. 13.

The dorsal horn is large and erect, with a red streak on each of its sides. It is apparently a rare species.

The females are the most abundant, and are larger than the males, and they also have longer horns.

The following list of species is here added :

C1. *E. curvispina*, Stål l.c. p. 38.
C2. *E. ermanni*, Griff.
O 3. *E. fairmairei*. Type of genus.
O4. *E. concinna*, Fowl. Trans. Ent. Soc. (1894) p. 619.

Sub-family : 0 *DARNINÆ.*

The biological student works at a disadvantage when he has only dry museum specimens to consult. The colours of Membracidæ are much brighter in life than shown by the examples which are stored in cabinets; and even these last appear somewhat different if viewed with lenses under concentrated light. The colours then appear to be more vivid, and some allowance must be made between small forms when viewed by the naked eye and the pictures they give when drawn under amplification, and the somewhat deceptive effects of perspective seen from different planes.

It is well known also that certain insect colours, vivid in life, are very evanescent; the bright and yellow greens of some Libellulæ, the verdant tints of many Lepidoptera, the brilliant hues of various caterpillars, all partaking more of the character of stains than of pigment, cannot be preserved indefinitely.

The foregoing remarks will explain why many dry examples of the foregoing Hoplophorinæ and of the Darninæ next to be described, which observers tell us are brilliant green or golden yellow when fresh captured, assume sombre tints before they come before the artist for representation.

There must be some compromise allowed between the drawings which attempt to represent the objects in their living forms and those which are treated more symmetrically, or "set" as the collector might wish to see them.

For dry scientific classification possibly the last representations may be more exact, but at the expense of the interest which insects in apparent motion will surely elicit.

The zoologist works also under greater disadvantage than the physicist, inasmuch as he can rarely resort to exact experiments to substantiate his hypotheses in classification.

On viewing an extensive series of genera or even species of Membracidæ, the inexperienced eye might doubt the correctness of certain homologues, and may ask can these things be correct? In botany, adepts have good reasons for stating that the banyan tree, the mulberry, fig, the hop, and the nettle have close affinities, notwithstanding the extreme divergences of their fruits and flowers. Similarly we may wonder at the usual grouping into one family of the rose, the plum, the strawberry, and the almond tree.

These remarks are introductory to the facts that great divergence of form in the insects of the family under consideration must be regarded as sports from accidental types, that is, that often such variations do not afford generic or even specific characters of importance.

Professor Huxley said, "those who refuse to go beyond fact rarely get as far as fact." Almost every great step in science has been in anticipation of nature through the invention of hypothesis, even though, in the career of usefulness, such hypothesis may have proved to be erroneous.

Hypothesis becomes more valuable in proportion to the number of facts it embodies. The evidence of evolution, the same thinker says, is inductively proved in accordance with the facts connected with the Eocene horse, exampled by the Eohippus of America.

Phenomena which appeal to our senses ought to be thought out descriptively. We imagine hypotheses through the contemplation of similarities, but theories must be used principally as helps in search of truth, and as such, they must not preoccupy the mind as if they were the laws themselves, or truths, which we can regard as absolutely conclusive.

Modern research has largely expanded Fairmaire's original genus Darnis, in which he described twenty-three species. Stål and recent authors have grouped numerous insects together, under a third section or sub-family (Darninæ) as indicated above.

The members of this group, however, are far from being homogeneous, and they hardly represent a natural classification. The materials available are yet too scanty to allow of such. Although about twenty genera are comprehended in the sub-family, some genera are represented by only three species, and others at present have only a single representative to give the characters for species which perhaps may be subsequently discovered.

Attempts have been made, with more or less success, to found characters on the wing-veining, coupled with the number of the discoidal cells. But authors are not agreed as to what should be the normal number of discoidal areas. Really the group is difficult to diagnose, particularly as Canon Fowler has shown that such characters as the position and distances of the ocelli are too obscure for satisfactory use, as has been proposed by Stål and other writers.

Fowler, in a measure, separates the curious genus Heteronotus from the rest, and places it last in the series, as having the tegmina twice as long as the wings, and as having the pronotum both spinose and nodose. It will be seen that the

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tegmina of nearly all the genera have long parallel-sided areas. These, as well as the apical cellules, are never found to be petiolate.

The genera may be approximately grouped as follows:

DARNINÆ.

I.

TEGMINA NOT MORE THAN HALF AS LONG AGAIN AS THE WINGS.

	Pronotum covering one half or more of the corium.	1. Aspona.
		2. Darnis.
		3. Hebeticoides.
		4. Tropidarnis.
		5. Stictopelta.

II.

TEGMINA FREE.

	Pronotum with a porrect frontal horn, but without suprahumeral processes.	6. Aconophora.
		7. Entaphinus.
a.	Pronotum with suprahumeral processes.	8. Alcmeone.
		9. Hyphinoë.
		10. Hemiptycha.
		11. Tomogonia.
		12. Ictaranthe.
		13. Nassunia.
b.	Pronotum without suprahumeral horn.	14. Cymbomorpha.
		15. Dysyncritus.
		16. Darnoides.
		17. Scaphula.

III.

TEGMINA AS LONG AS THE WINGS.

Pronotum both nodose and spinous.	18. Heteronotus.

Synoptic tables may appear to be easy to use as drawn on paper, but they are difficult to construct in a strictly reliable manner.

I insert, after Hyphinoë, some species of the modified genus Hemiptycha of Fairmaire. They are not included in the Biologia of Central America, the examples occurring chiefly in Brazil.

Certain preliminary characters may be drawn from the amount to which the alary organs are covered by the pronotum. But cabinet specimens are not well suited to show this obscuration of the tegmina and wings.

It is obvious that insects preparing for, or concluding, their short flights, are not in a suitable position for showing such characteristic grouping. Nevertheless, I have in part adopted Canon Fowler's synoptic table in the Biologia, which is partly founded on the above characters of concealment of the wings. His suggestive hints in grouping this difficult section of the family are distinct helps; but, like him, I would state that reference to the diagnosis of a species should be more studied than strict adherence to the terms of a synoptic table, however carefully it may have been constructed.

A quiet mimicry for concealment is common enough in animals. Deterrent devices for concealment are not so common, and perhaps they can be less obviously proved; yet some of the Darninæ take on themselves the device (if the term may be allowed) of disguising themselves as slimy, and presumably distasteful slugs.

Some long taper forms, grey and glistening, are exampled by such species as *Darnis limacodes* of Burmeister and Fairmaire, and *Hebetica convoluta* of Fabricius.

Genus: ASPONA, Stål.

Kongl. Sv. Vet. Ak. Handl. (2) iii. (19); (Bidrag till Rio Janeiro-trackteur Hemipter Fauna ii.) p. 29 (1860); Fowl. B.C.A. l.c. p. 50.

The form of this genus is peculiar, from the broad globose aspect, and the strong punctuation of the pronotum.

This turgescence or inflated appearance rather recalls that of the bladder-like form of the genus Combophora. The tegmen of the type has only one discoidal area, but Fowler shows that this neuration is not constant, for other species, like *A. turgescens*, show two discoidals.

This genus comprises rather small broad robust species, with the pronotum as long as the tegmina. The neuration of the wings differs much from that of the genus Darnis, and is variable from species to species as shown by my figures, which have been enlarged (by permission) from the Biologia.

ASPONA BULLATA.

(Plate XXII. figs. 3, 3a, 3b.)

Stål l.c. Kong. Vet. Akad.

Colour to the naked eye velvety brown, but seen under the microscope, under a strong light, more ochreous and coarsely pitted; the head and the posterior parts of the pronotum the palest in colour; dorsum rising globosely with one central and two obscure side carinæ; the lower margin sinuous, and deeply notched below the small and obtuse suprahumerals; legs rather short and ochreous in tint; tegmina hyaline, with neuration of varying thickness, the veins near the costa being the coarsest.

My figure is drawn from a specimen kindly forwarded to me from the Stockholm Museum by Dr. C. Aurivillius.

Expanse of wings, 23 mm.

Size, 7 × 5 mm.

Habitat.—Brazil.

The genus Aspona appears to be restricted as to the number of species: Canon Fowler describes and figures the following:

ASPONA TURGESCENS, Fowl.

B.C.A. Tab. IV. figs. 12, 12a–12e, p. 50.

Habitat.—Guatemala.

ASPONA INTERMEDIA, Fowl.

B.C.A. Tab. IV. figs. 13, 13a–13e.

Habitat.—Panama, Bugaba.

ASPONA CUNEATA, Fowl.

B.C.A. Tab. IV. figs. 14, 14a, 14b.

Habitat.—Volcan di Chirique.

Tragopa aspera of Walker is probably a small species of Aspona nearly allied to *A. bullata.*

GENUS: ALCMEONE, Stål.

Stål. Öfv. Kongl. Vet. Ak. Förh. xxiv. p. 558 (1867), xxvi. p. 256 (1869).

Fowler (B.C.A. p. 72) remarks that this is one of the most distinct of the genera formed by Stål out of the old genus Hemiptycha of Germar.

The species which are chiefly from Brazil, Cayenne, and Central America may be distinguished by their very broad pronota and the aculeate form of the posterior apices.

Pronotum seen from above is inflated in front, and abruptly produced behind into a lanceolate point (Fowler). The humeral angles are but slightly produced, but the shoulder horns are obvious.

The areas of the tegmina are narrow and elongated.

ALCMEONE CENTROTOIDES.

(Plate XXIV. figs. 6, 6a, 6b.)

Hemiptycha centrotoides, Fairm. l.c. p. 317.

Fairmaire gives as a description: obscurely yellow, with the suprahumera horns horizontal, and tipped, like the posterior apex, with black.

Sometimes a brown colour occupies the greater part of the dorsum, and the yellow portion forms two oblique bands.

This insect is obviously liable to considerable variation in colour, and the figure I give above only partly agrees with Fairmaire's diagnosis in this respect. The insect figured is drawn from a specimen kindly lent by Dr. Aurivillius from the Stockholm Museum.

General colour warm brown, with a tendency to ochreous yellow on the metopidium, and more strongly at the tips of the tegmina; pronotum broad and swollen between the pointed suprahumerals, which are divergent; dorsum suddenly narrowing at about two-thirds of its length to a tapering sharp point; costal and discoidal parts of the tegmina rich brown; rest of the membrane sub-hyaline, and obscurely veined; legs fuscous; hind pair the longest; ocelli in deep depressions on the frons.

Very like a Centrotus but the scutellum is covered.

Size of female, 12 × 6 mm.

Habitat.—Rio Janeiro.

OALCMEONE GODMANI, Fowl.

Fowler B.C.A. Tab. V. figs. 24, 24a, 24b, p. 72.

A remarkable insect, and one of the most conspicuous amongst the Membracidæ.

Broad and robust; head and metopidium scarlet; dorsal part of the pronotum shining black, with the front, sides, and space before the posterior apical process bright scarlet; apical process long, pointed and black; tegmina fuscous and darker towards the base; legs testaceous; there is a black line proceeding from the highest part of the pronotum to the suprahumeral edge.

Length, 15 mm.; width between the horns, 10 mm.

Habitat.—Mexico, Jalisco.

Additions to OAlcmeone (Type *Hemiptycha centrotoides*) may be noted.

OALCMEONE CASEOSCALPRIS.

Butl. Cist. Ent. ii. p. 344, 26.

Habitat.—(?).

OALCMEONE CURVICORNIS, Stål.

Œfv. Vet. Ak. Förh. p. 256 (1869).

Habitat.—Cayenne.

GENUS: ODARNIS.

Fabricius, Syst. Rhyng. p. 25: Burm. Fairm. Stål, Butler, Walk. Fowler.

Canon Fowler restricts this genus to three species in his B.C.A. He gives for characters by which the genus may be known, as having the greater part of the tegmina uncovered, and certain peculiarities of the neuration. This last character is marked by three veins, viz., "one radial and two ulnar" proceeding from the base; and two discoidals.

The pronotum is marked by a yellow band. The humeral angle is not, or is only slightly and bluntly produced; dorsum convex and not carinated; apex rather curved over the tegmina.

Fowler subdivides the old genus Darnis into Darnis, Hebetecoides, Stictopelta, and Tropidarnis.

O DARNIS PARTITA, Walk.

(Plate XXII. figs. 4, 4a; Plate XXII. figs. 5, 5a, var.)

Walk. Insect. Saundersiana, p. 15; Fowler, l.c. Tab. IV. figs. 15, 15b.

Pronotum shining black or deep brown,, with three yellow curved transverse bands across the dorsum, united to a yellow band on the marginal border; frons with a yellow spot; tegmina as long as the pronotum, rich brown; legs ochreous, with black femoral tips.

The insect figured is from an example taken by Bates on the Amazons.

Fowler remarks its similarity to O *Ochrolomia tricincta* of Stål, which, however, wants the anterior band.

Size, 8 × 4 mm.

Habitat.—Panama, Bugaba, Chiriqui, the Amazons.

O DARNIS SUTURALIS, Germ.

(Plate XXII. figs. 6, 6a, 6b.)

O *Darnis trifasciata*, Fairm. Ann. Soc. Ent. 481.

Very shining dark brown or pitchy black, with a broad central bright ochreous band down the centre of the dorsum, with another also on each lower margin of the pronotum; another short interrupted stripe over each shoulder rising from the blunt inconspicuous suprahumerals; frons with a largish orange spot in its centre and another spot on each inner margin of the eyes; the metopidium has also two spots, thus showing in front five spots in all; seen unexpanded from the back, neither eyes, legs nor tegmina are visible; legs ochreous, with black knees; tarsi ferruginous.

Size, 9 × 5 mm.

Habitat.—Brazil.

From B.M. Collection.

6 DARNIS LIMAX, n.s.

(Plate XXII. figs. 7, 7a, 7b.)

Long, pointed, sluglike in its form and in its apparent sliminess; pronotum polished, and mottled with brown and ochreous stains; lower margin straight, and extending to the points of the tegmina; eyes large and yellow; tegmina rich sienna brown, with strong brown venation; metopidium without suprahumeral projections.

Size, 6 × 3 mm.

Habitat.—Rio Dagua, Colombia.

This insect does not appear to represent *D. limacodes* of Fairmaire, but his description is very meagre.

DARNIS LATERALIS, Fab. Sys. Rhyn. p. 272.

(Plate XXII. fig. 8.)

Fairm. l.c. p. 480; Germ. Burm. Amy. Serv. l.c. p. 515; Fowler, l.c. p. 52; Coquebert, Icon. Ins. p. 78, Plate 18, fig. 9 (1801).

Small; pronotum dull pitchy brown, with an ochreous stripe on the margin, the upper border of which is indented and undulating; frons convex, unspotted and slightly pilose in front; legs with black tips to the tibiæ, and ferruginous tarsi; tegmina with the bases brown and apices more hyaline; limbus broad, neuration dark brown.

Fairmaire gives as a character: "Capitis puncto medio."

Size, 8 × 4 mm.

Habitat.—Brazil: Cayenne.

B.M. Collection.

DARNIS FLAVICEPS, Burm.

(Plate XXIII. fig. 1 ♂ to fig. 3a. ♀)

Burm. Rev. Silb. iv. p. 169; Fairm. l.e. p. 280; Fowl. l.c. p. 53; *Darnis latior*, Tab. IV. fig. 16. Butler, *Darnis limbata*, Cist. Ent. ii. p. 341; *Leptosticta flaviceps*, Stål, Hemip. Fabr. ii. p. 32.

Colour chestnut brown, with a broad bright yellow band, more or less disruptive, extending from the head to the pronotal apex, and parallel to the lower margin; tegmina rich sienna brown, but doubtful in constancy as to the strict neuration; abdomen of the ♂ dark brown, of the ♀ buff colour; femora testaceous, tibiæ yellow or buff, ringed with brown; metopidium convex, with a yellow collar and small humeral angles. Fig. 3 on the above plate must be a variety or else a different species. The supra-humerals are not developed.

Size, 9 × 4 to 13 × 6 mm.

Habitats.—Brazil, Para, Amazon, Cachabi, Ecuador.

In the British Museum Collection there are several dark and also lighter-coloured specimens named *Leptosticta flaviceps*, some of which may range under *L. indeterminata* of Walker. They have two or three short obscure dashes between the shoulders, measure about 12 × 5 mm., and are labelled, *Constancia*. January.

GENUS O? TROPIDARNIS, Fowler.

Distinguished by the dorsum being raised and acutely keeled; three nervures run from the base of the corium, as in Darnis, Leptosticta and Hebeticoides. There are two discoidal areas, the interior being the longest (Fowler, p. 60).

Two species are noted by him, namely:

O TROPIDARNIS TECTIGERA.

Fowler, l.c. Tab. V. figs. 7, 7a, 7b, p. 60.

Size, 9 × 5 mm.

Habitat.—Amula in Guerrero, 6000 feet.

O TROPIDARNIS ACUTIOR.

Fowl. l.c. p. 61.

The keel is here more acute than in the last species.

Size, 9 × 4 mm.

Habitat.—Mexico.

O TROPIDARNIS PELLICOLOR, n.s.

(Plate XXIV. figs. 4, 4a, 4b.)

Much larger than O *T. tectigera*, and the dorsal ridge more arcuate, and flattened on the frons. There is a tendency to show another ridge behind the rounded shoulder-angles. Colour shining ochreous, or skin coloured; an obscure brown stain occurs below the dorsal ridge; tegmina brown, and just seen below the pronotal margin; legs brownish, spotted, prismatic, and finely serrated; eyes small and pale; frons long and narrow.

Figured from a fine specimen in the Hope Collection.

Size, 15 × 7 mm.

O TROPIDARNIS ROBUSTUS, n.s.

(Plate XXIV. figs. 5, 5a.)

Less sluglike in form than Stictopelta, with a longitudinal keel extending from the metopidium to the pronotal apex; finely punctured ferruginous yellow; suprahumerals sharp, but small; two faint depressions above the eyes; tegmina brown, with pale neuration.

I include this in Tropidarnis chiefly from the presence of the marked dorsal keels. Though nearly allied to ✓ *T. tectigera*, I think it is distinct.

Size, 10 × 5 mm.

Habitat.—Mexico.

Hope Collection.

GENUS: STICTOPELTA.

Stål, Kongl. Vet. Ak. Band. viii. p. 32; Fowl. l.c. p. 55.

The species of this genus run much into one another, but the variation is distinct. Fowler sees but little difference between Stål's genus Cryptophora and his Stictopelta, except that the former is more elongated in the pronotum (*see* page 55).

Some compromise is desirable between the requirements of the logical evolutionist, who practically merges all species into one another and treats structural differences as temporary variations; and the systematist who by multiplying genera makes specific groups take the place of species themselves, though he does not call them such.

Species must be considered constant, at least in historic time. Pushed back into palæontologic time, they seem to disappear or resolve themselves into simple groups. Under the old systems of Fabricius and Linneus, Umbonia and Centrotus were grouped under the genus Membracis.

The question may be asked, are sub-genera, &c., more than helps perhaps of doubtful value as to making a classification of animals natural.

It may be heresy to state, that many think the standard of fertility, *inter se*, is a good test for proving a species, notwithstanding the complicated problems which are connected with cross-fertilisation and the like.

Species representing Stictopelta, Hebetica, Hebeticoides, and Tropidarnis, have much the same general facies as the genus Darnis of Burmeister, but this sub-division is useful.

STICTOPELTA AFFINIS.

Fowl. l.c. p. 55; *S. transversalis*, Walk. l.c. Suppt. p. 148.

Habitat.—Temax, Mexico.

STICTOPELTA BIPUNCTATA, Burm.

Darnis bipunctata, Burm. l.c. p. 171; *D. adusta*, Burm. l.c. p. 171; *Stictopelta bipunctata*, Butler, l.c. p. 340; *S. adusta*, Butler, l.c. p. 340; *S. bipunctata*, Fowl. l.c. Tab. IV. fig. 19, p. 55.

Pronotum rich brown, or black like an oat-seed, but with an orange patch developed on each side; legs obscure ochreous brown; head across the eyes, long and narrow; the females are darker than the males.

Size, 9 × 4 mm.

Habitat.—Mexico, Amula, Brazil.

0 STICTOPELTA STRIGIFRONS.

Fairm. l.c. p. 481; Fowler, l.c. p. 53.

Shining yellow; the legs with a black striga or line.

Length, 9 mm.

Habitat.—Mexico.

0 STICTOPELTA ZONIFERA.

Ochrolomia zonifera, Butl. Cist. Ent. ii. p. 339, fig. 2; Fowl. l.c. p. 56

Size, 8 mm.

Habitat.—Mexico.

0 STICTOPELTA PUNCTATA.

√ Fowl. l.c. Tab. V. fig. 2, p. 57.

Size, 9 mm.

Habitat.—Mescala in Guerrero.

0 STICTOPELTA ASSIMILIS.

Fowl. l.c. p. 57.

Size, 8 × 4 mm. Not unlike *S. varians*.

Habitat.—Guatemala.

0 STICTOPELTA HINNULEUS.

Fowl. l.c. p. 57.

Colour olivaceous with a white border, which extends behind the shoulders.

Size, 11 × 6 mm. A large insect.

Habitat.—Orizaba.

0 STICTOPELTA FRATERNA.

Butl. Cist. Ent. ii. p. 340.

Some of these insects must be received with caution as to their being true species. The description given by authors are too indefinite, and it is only by an appeal to their life history and economy that their classification can be safely fixed.

0 STICTOPELTA LINEIFRONS.

(Plate XXIII. figs. 4, 4a.)

Fowl. l.c. Tab. V. figs. 3–3b, p. 58.

Colour greyish-green; pronotum elongate and pointed; metopidium with three or four dark transverse lines; tegmina hyaline, with brown neuration, which with structure of the wings is typical.

Size, 7 × 3 mm

Habitat.—Mexico, Temax, North Yucatan.

From the Hope Collection.

O STICTOPELTA NIGRIFRONS, Fowl.

(Plate XXIII. fig. 5.)

Fowl. l.c. Tab. V. figs. 4, 1a, p. 58.

Colour ochreous green; the fore-part of the pronotum black for about one-third of its length; tegmina grey-green, with the greater part covered by the pronotum; legs short and ferruginous brown. Not unlike O *Darnis incerta* of Walker.

Size, 7 × 4 mm.

Habitat.—Temax, North Yucatan.

Fowler's Collection.

O STICTOPELTA INDETERMINATA, Walk.

(Plate XXIII. fig. 6.)

Fowl. Tab. V. fig. 5.

Large; concolorous sordid ochreous yellow; some examples have a greenish tint; pronotum glabrous, sinuous, and obtusely rounded under the shoulders; apical point black or very dusky; tegmina quite covered; frons long and narrow; the pronotal margin shows generally an obscure fuscous band.

This species is common in collections. It varies greatly as to size and colour and so much, that some might make diverse species from a series of specimens.

Size, 13 × 6 to 11 × 5 mm.

Habitat.—Vera Cruz, Panama, Rio de Janeiro.

There is a specimen in the Hope Collection labelled *Stictopelta incerta,* Walker, or *Ochrolomia incerta,* Butler, which I cannot separate from *S. indeterminata,* though it is smaller. It has a similar habitat. Fowler includes incerta, however, in his "Catalogue of Species," but he gives no diagnosis.

The character as to how much of the tegmina is covered by the pronotum is of doubtful value.

It is remarkable how closely the wings and the legs can be folded and packed into small compass when the insect is at rest. During flight, and some time after it, the abdomen is depressed and fully exposed to view.

O STICTOPELTA ACUTULA, Fairm.

(Plate XXIII. fig. 7.)

O *Darnis acutula,* Fairm. l.c. p. 481; *D. brevis,* Fairm. l.c. p. 483; O *Cryptoptera acutula,* Butl. Cist. Ent. ii. p. 342; O *C. brevis,* Butl. l.c. p. 342; Fowler, l.c. Tab. V. figs. 6, 6b, p. 60.

Rather small, and not unlike the next species, O *S. olivacea,* but more ochreous in colour, and the hyaline tegmina have a reddish neuration; these tegmina often show above the margins of the pronotum.

My figure is that of a female from Canon Fowler's private collection

Size, 18 × 4 mm.

Habitat.—Volcan de Chiriqui.

STICTOPELTA OLIVACEA, Fab.

(Plate XXIV. figs. 2, 2a.)

Darnis prasina, Fairm. l.c. p. 482. and *D. olivacea*, p. 483; *Cryptoptera olivacea*, Stål.

Greenish or olive yellow or dark olive; shining and slightly punctured; apex browner; tegmina, when insect is at rest, quite covered, but the clouded membrane often seen exposed when half folded; neuration strongly marked by four apical cells. In form much as in Hebetica.

Fowler examined both Signoret's and Fairmaire's types of *Darnis prasina*, and he states his belief in the probable correctness of the above synonyms.

Size, 13 × 5 mm.

Habitat.—Venezuela, Brazil.

STICTOPELTA VARIANS, Fowl.

(Plate XXIV. figs. 3, 3a, 3b.)

Fowl. l.c. Tab. V. fig. 1, p. 56.

Shining, smooth, ochreous yellow or nut-brown; pronotum unarmed and without suprahumeral horns and as long as the tegmina, which last are brownish and but little covered by it; a pale buff-coloured oval patch, bounded by a fine black streak, occurs on each side, above the marginal edges; legs dark ochreous, with dark borders and dark tarsi; frons broad between the eyes, with remote intermediate ocelli.

This is the variety of Stictopelta, which is noted by Fowler, as having the black streak.

Size, 9 × 4 mm.

Habitat.—Jalisco, Venturas, Mexico, 2000 feet elevation.

GENUS: HEBETICOIDES, Fowler.

Stål names Hebetica and Leptosticta as subdivisions of the old genus Darnis. After describing these genera, in which he remarks that Hebetica has only two longitudinal veins in the tegmen, and Leptosticta has three, he gives us further characters for Hebetica, viz., head and thorax pubescent; tègmina not exposed beyond the sides of the pronotum.

Type, *Darnis convoluta*, Ol.; *D. limacoides*, Burm.; and for *Leptosticta*, *D. flaviceps*, Burm.

Canon Fowler includes neither of these genera in the *Biologia*, but he adopts the above genus (Hebeticoides) as having intermediate characters, and he enters largely into his reasons for so doing on page 52 of the monograph, to which the reader is referred.

My materials are too scanty for criticism, and I follow the scheme he offers. He describes three species of this genus.

HEBETICOIDES ACUTUS, Fowl.

(Plate XXIII. figs. 8, 8a.)
Fowl. l.c. Tab. IV. fig. 17, p. 53.

Large, broad in front, and tapering from the shoulders to a sharp apex; colour rich shining purplish brown, with a yellow margin extending above the eyes to the posterior point; legs yellow, but concealed from the back view.

Size, 12 × 5 mm.

Habitat.—Guatemala, Panama.

Many of the Daninæ have the appearance of shining seeds; some are like black oats, or yellow beardless barley.

I have had no opportunity of drawing either *Hebeticoides confusus*, Fowler, or *H. denticulatus*, Fowler.

HEBETICOIDES CONFUSUS, Fowl.

Fowler, l.c. Tab. IV. figs. 18, 18a–b, p. 54.

Size, 9 × 4 mm.

Habitat.—Chiriqui, Panama, 4000 feet.

HEBETICOIDES DENTICULATUS, Fowl.

Fowler, l.c. p. 54.

A long and broad species with toothed legs; underside black.

Size, 11 × 5 mm.

Habitat.—Mexico.

GENUS: HEBETICA, Stål.

Darnis limacodes, Burm. (Type), Fairm. (*sic*) l.c. p. 483.

HEBETICA CONVOLUTA, Burm.

(Plate XXIV. fig. 1.)
Darnis convoluta, Fairm. l.c. p. 482; *H. convoluta*, Stål.

Large, long, pointed, and sluglike in form; of a shining olive-green colour, with a broad yellow border from the head to the apex; legs yellow, with the tibiæ mottled with brown and slightly fimbriated. The species is liable to variation in colour.

Size, 13 × 6 mm.

Habitat.—Brazil.

Figured from the B.M. Collection.

GENUS: HYPHINÖE.

Stål, Œfv. Vet. Akad. Förh. 24, p. 558 (1866); Fowler, B.C.A. p. 73.

This genus is a difficult one to identify, partly from the variable shape of the pronotum, partly from the different sizes of the species, from the different habitats, and also from the fact that the suprahumeral horns are more developed in the female than in the male sex.

This last character might suggest to entomologists, that certain examples belong to quite different species.

The examination of a series is often puzzling when the examples in a collection give us no certain help as to the places of capture.

Hyphinöe is one of the genera separated by Stål from the somewhat heterogeneous group comprised in Hemiptycha of Germar and Fairmaire.

The only known habitats at present, are the regions of Central America. Observers on the spot only can be certain that apparent differences are or not sexual. If the insects are in close company, proof is easy.

HYPHINÖE MARGINALIS.

(Plate XXV. figs. 1, 1a.)

Fallon, Rev. d'Ento: IX. p. 353; Fowler, l.c. p. 75; Tab. V. fig. 25 (*H. marginata*).

In form, general colour and size much like *H. asphaltina*, but may be readily distinguished by a curved yellow or ochreous band on each side of the pronotum; this crescent-shaped streak extends from the summit of the pronotum to the extreme apex, and is in part parallel to the lower margin; legs ochreous or dusky orange.

The front view shows the metopidium high, broad, and flattish at the top. Suprahumerals barely developed. This insect is remarkable.

Size, 15 × 8 mm.

Habitat.—Guatemala.

HYPHINÖE ASPHALTINA.

(Plate XXV. figs. 2, 2a, 2b.)

Hemiptycha asphaltina, Fairm. l.c. p. 319, Pl. VI. fig. 20; *H. apriformis*, ♂ Walk., l.c. Suppt. p. 144; *H. pubescens*, ♀ Walk. l.c. p. 144; *Hyphinöe morio*, Stål, l.c. XXVI. p. 257 (1869).

Shining black; pronotum rising into a high and rounded dorsal eminence which slopes to a sharp apex extending to the tips of the tegmina; metopidium high and broad between the suprahumerals.

Tegmina rich brown, or blackish and shining; wings delicate and hyaline;

underside and abdomen dull orange; legs ferruginous with yellow tarsi; hind tarsi the longest.

Size variable from 17 × 9 to 14 × 6 mm.

The sexes also notably vary in size.

My figure is from a type specimen, a female in the Stockholm Museum, and marked *H. morio*, Stal. It agrees except in being small as compared with insects taken at 4000 feet elevation on the Volcan de Chiriqui in Panama.

Habitat.—Bogota, Brazil; Rio Dagua, Colombia.

HYPHINÖE CUNEATA (HEMIPTYCHA), Germ.

Fairm. l.c. p. 319, Pl. VI. fig. 26; *H. cuneata*, Fowl. l.c. p. 73; ♂ *Hemiptycha globiceps*, Fairm. l.c. p. 319, Pl. VI. fig. 19.

Large, light ochreous yellow, finely punctured; metopidium perpendicular and tumose; suprahumeral angles wide apart, and tipped with shining black. Dorsal ridge sinuous with a dark brown oblong patch on each side; apex of pronotum black, and nearly extending to the tips of the tegmina; tegmina free, warm sienna brown; legs ochreous. The female is much larger than the male, which only measures 15 × 6 mm. ♂.

Size, 18 × 9 mm. ♀.

Habitat.—Mexico.

Fairmaire gives a specific character, "Jaune, poilue," but the examples I have from several sources are all smooth and shining.

Fowler says that *Hemiptycha globiceps* of Fairmaire is the male of *Hemiptycha cuneata*.

HYPHINÖE QUADRIMACULATA, n.s.

(Plate XXV. fig. 3.)

Colour pale cinnamon brown, shining; pronotum punctured, with short horns spreading horizontally; a black spot on each side; dorsal ridge straight, with the sharp apex reaching nearly to the tips of the tegmina; metopidium perpendicular; hind coxæ large, giving rise to long and slender legs; tegmina, each with an obscure dark spot, thus making the spots four in number.

Size, 8 × 4 mm.

Habitat.—Brazil.

HYPHINÖE GLOBICEPS.

(Plate XXV. figs. 4, 4a, ♀.)

Fairm. l.c. p. 319, 20, Pl. VI. fig. 20; Walk. l.c. p. 373.

Large; ochreous yellow, pilose, with the suprahumerals blunt and tipped with black; an oblong dark brown spot on each side of the pronotum, which sharply ends in a black tip; tegmina shining brown; legs yellow.

Size, 17 × 7 mm.

Habitat.—Mexico.

The example figured is that of a female. It is larger than that given by Fairmaire, but it very generally agrees with his description and figure.

Fowler, however, considers *H. globiceps*, Fairmaire, to be the male of *H. cuneata*, and he includes it in his synonyms of that species. A microscopic examination of a series is to be desired, before eliminating *H. globiceps* from the list of species.

HYPHINÖE TAU.

(Plate XXV. figs. 5, 5a, 5b)

Fowler, Tab. VI. fig. 1, p. 76.

Pronotum shining ochreous, fuscous at the back, punctured and finely pilose; a black roundish impressed spot occurs in each side; the posterior apex is black, and extends nearly to the tips of the tegmina; these last organs are fine warm sienna-brown or violaceous; legs pale ochreous; the pronotum seen from above has somewhat the form of a **T**, or a hammer head.

Some species of this genus were thought by old writers to be Asiatic, but this locality seems very doubtful.

Size, 12 × 6 mm.

Habitat.—El Reposo, at 800 feet elevation.

HYPHINÖE SUBFUSCA, n.s.

(Plate XXV. figs. 6, 6a.)

Shining; colour ferruginous brown.

This rather obscurely marked species is allied to *Hyphinöe tau*, and also to the variety *H. atitlana*, figured by Fowler.

Perhaps the most marked character is centred in the large ocellated spot on each side of the pronotum, and the rather sharp but short suprahumeral horns, which point upwards, and are not easily seen.

The general colour is fuscous, with a large oval ochreous patch on each side of the pronotum, each having a central stain; the hind part is also marked with a yellow bar; tegmina subhyaline with a tendency to show the neuration of a Ceresa; legs sienna brown; hind pair the longest.

Size, 10 × 6 mm.

Habitat.—Volcan de Chiriqui.

Rosenberg Collection.

HYPHINÖE BIGUTTA.

(Plate XXVI. figs. 1, 1a.)

Walk. *H. bigutta*, l.c. Suppt. p. 112; Fowl. l.c. Tab. VI. fig. 7, 7a, ♀ p. 78.

Pronotum punctured, shining ochreous yellow, with a convex and sinuous dorsal ridge; much depressed at the sides, with an obscure brown spot in the depression; suprahumeral horns broad at their bases, obtuse, but pointed with black; tegmina rich sienna brown; legs ochreous yellow.

By the dorsal aspect the suprahumerals are set at right angles, plane or flat, between them, and continuous with the metopidium. The tegmina with five apical areas.

Size, 12 × 8 mm.

Habitat.—El Reposo, Volcan de Atitlan.

O HYPHINÖE PURULENSIS.

(Plate XXVI. figs. 2–2b.)

Fowl. l.c. Tab. VI. fig. 4, 4b, ♀ fig. 5, 5a, ♂ p. 77.

Large; rich dark brown, shining, punctured with a conspicuous ochreous stripe bounding the straight lower margin of the pronotum; dorsum straight without sinuosities; suprahumeral horn stout, pointed, acute and black at the tips; frons and metopidium dull ochreous, convex; tegmina dark violaceous brown, punctured, yet very shining, and rather projecting beyond the tip of the pronotum; legs dark ferruginous and rather short.

Fowler describes this species, as having a conspicuous dark spot on each side of the pronotum. The example I figure from his private collection does not show these spots, but there are depressions on the disc which may represent them. My specimen is larger than the normal, so I conclude it to be a slight variety. In other respects it agrees with his diagnosis.

The males are smaller than the females. Some varieties have outward resemblances to the genus Ceresa.

Size, 17 × 8 mm.; 14 × 7 mm.

Habitat.—Purula, Guatemata, Sabo in Vera Paz.

OHYPHINÖE PURULENSIS, var.? ♂.

(Plate XXVI. figs. 6, 6a.)

There is a much smaller insect in the Fowler Collection which differs somewhat from that here described, inasmuch as the suprahumeral horns are almost suppressed, and the pronotal disc has a conspicuous brown spot on each side. Added to this there is no marginal stripe.

Notwithstanding the circumstance that I could not dissect this specimen for proof of the sex, I regard it as a male example of the above species.

Size, 13 × 6 mm.

Habitat.—Sabo, Vera Paz.

N.B.—Figures 1, 1a, 1b, and 2, 2a, are drawn under the same amplification.

HYPHINÖE PUNCTORUM, n.s.

(Plate XXVIII. figs. 3, 3a.)

In the late Mr. Wollaston's Collection there is an insect closely allied to *Hyphinöe purulensis*, yet it differs in several respects. I describe and draw it for comparison. I hesitate to think it only a variety of *Hemiptycha punctum* of Fairmaire, though his figure 22, Pl. VI. p. 218, strongly recalls it; and therefore I name it from the distinct row of small brown dots disposed above the pronotal margin.

Colour ochreous yellow, finely punctured; besides the above-mentioned brown dots, a large brown spot occurs on each side of the pronotum; the suprahumeral horns are subacute, short, and divergent; the pronotum has a straight ridge passing from the head to the apex, and is as long as the tegmina; these last organs are grey coloured, with obscure yellow neuration; the legs are pale. The insect is larger than *H. purulensis* or *H. punctum* with which it might be collated. In outward appearance it even might be referred to the genus Ceresa.

Size, 11 × 8 mm.

Habitat.—Rio de Janeiro.

N.B.—For convenience in grouping Plate XXVIII. this species has been there placed. The above description is here ranged under the genus Hyphinöe, but the figure is there out of sequence.

HYPHINÖE ATITLANA, Fowl.

Fowl, l.c. Tab. VI. fig. 2.

Fowler says this is a very distinct little species, but seems to think it may prove to be only a variety of *H. tau*. The male insect was only known to him. The figures given do not show much difference from *H. tau*, so here I treat it as a variety captured on the Volcan de Atitlan, Guatemala. Height, 3500 feet.

HYPHINÖE CAMELUS, Gray.

Darnis camelus, Griffith, An. Kingd. p. 260, Pl. 109, fig. 3; *Hemiptycha camelus*, Fairm. l.c. p. 319, Pl. VI. fig. 21; *H. camelus*, Stål, l.c. 26, p. 257; *H. camelus*, Fowl. l.c. p. 73; *Hemiptycha sagata*, Germ. l.c. p. 245; *Triquetra valida*, Walk. l.c. p. 524; *Thelia obliqua*, Walk. Ins. Saund. p. 73; var. *H. viridissima*, Butl. Cist. Ent. II. p. 345.

HYPHINÖE CORNUTA.

Distant, Ent. Mon. Mag. XVI. p. 12 (1879); Fowl. l.c. p. 76; Tab. VI. figs. 3, 3a, 3b.

Habitat.—Costa Rica, Iraza, 7000 feet.

Said to be like *Hemiptycha punctum*, Fairm., or *H. tau*, but it would appear to be considerably smaller than the insect I consider represents Fairmaire's remarkable species *H. alata* with its spreading humeral horns.

HYPHINÖE PLACIDA.

Germar (Hemiptycha), l.c. p. 318, 219 (1835).

Habitat.—Brazil.

HYPHINÖE DIABOLICA.

Butl. l.c. p. 346.

Habitat.—?

HYPHINÖE VULPECULA.

Fowl. l.c. p. 77; Tab. VI. figs. 6, 6a, 6b.

Uniformly brown with a straight dorsal ridge; suprahumeral horns moderately long, and slightly curved backwards; large.

Allied to Hemiptycha proper.

Size, 17 × 10 mm.

Habitat.—Panama. Volcan de Chiriqui, to 6000 feet.

HYPHINÖE OCHRACEA.

Fowl. l.c. p. 78; Tab. VI. figs. 8, 8a.

Ochraceous yellow; pronotum much elevated in front, with a broad dark band extending from the marginal edge above the shoulders to the highest point of the pronotum; large; no suprahumeral processes are shown in Fowler's figure, but he says "they are longer and more curved than in any other member of the genus and rather resemble the horns of the species of the genus Hemiptycha proper."

Size, 15 × 7 mm.

Habitat.—Guatemala.

Species of Hyphinöe are very confusing from their difference in facies. Stål's descriptions are by no means easily realised or clearly made out.

HYPHINÖE THORACATA, Distant.

Distant, Trans. Ent. Soc. 1900, Part IV. p. 695.

Ochraceous; the area between the humeral horns, the dorsal area, and apex of pronotum black, or dark castaneous; tegmina brownish; pronotum finely punctate; humeral angles robust, hardly directed upwards or forwards; pronotal apex shorter than the tegmina.

Size, 14 × 7 mm.

Habitat.—Costa Rica, Guaitil de Pérrés, Pacific Slopes.

Allied to 0 *H. cornuta*, Dist.

0 HYPHINÖE PROCLIVIS, Distant.

Distant, Trans. Ent. Soc. 1900, Part IV. p. 695.

Ochraceous, thickly and coarsely punctured; apices of the humeral horns continued in a broad lateral fascia to the humeral margins; apex of the pronotum and the tegmina dark castaneous or black; legs ochraceous; tibiæ sulcated and pilose; suprahumerals with apices obtuse and moderately directed upwardly; the apex of the pronotum about reaches the apex of the tegmina.

Length, 14 mm.; exp. prot. aug. 8 mm.

Habitat.—√ Costa Rica, Bruschik, Atlantic Slopes.

Allied to *H. cornuta*, Dist.; but it wants the pronotal spots.

0 GENUS: DARNOIDES.

Fairmaire, l.c. p. 495.

This genus is represented by three or four small American species of which C *D. limbata* is the type.

Probably the species more nearly are allied to Acutalis than Darnis, but there is much discrepancy between authors as to the variation in form and the neuration. Fairmaire gives one discoidal area in the tegmina, whilst Stål gives two, and there are insects which even possess three areas.

My figure is taken from an example in Fowler's Collection.

6 DARNOIDES AFFINIS.

(Plate XXVI. fig. 4, a–b.)

Fowler, l.c. Tab. VI. figs. 4–4b, p. 82.

Small; pronotum warm ochreous yellow; broad between the shoulders, and tapering to a sharp point considerably short of the tegmina; these last are very delicate and hyaline, with a broad limbus which is still broader in the lower wings; legs ochreous. My example shows two discoidal areas.

Size, 4 × 2 mm.

Habitat.—El Reposo.

DARNOIDES LIMBATA.

Fairm. l.c. Pl. VII. fig. 16, p. 495.

Size, 9 mm.

Habitat.—Colombia

DARNOIDES BRUNNEA.

Fairm. l.c. p. 496.

Brown, punctured; with the pectus, anus, and the femora black. Head and tibiæ testaceous.

Size, 7 mm.

DYSYNCRITUS INTECTUS.

(Plate XXVI. figs. 5, 5a.)

Fowler, l.c. Tab. VI. figs. 13, 13a, p. 81.

Very small; colour ochreous yellow, mottled with brown; dorsal ridge of the pronotum more or less sinuous; tegmina greyish ochreous, mottled with brown, furnished with a clear limbal margin; legs short, the middle pair spotted.

Fowler considers this genus to be allied to Nassunia or Hypamastris. There appears to be only one species at present described.

My figure is from a defective example in Fowler's private collection.

Size, 4 × 2 mm.

Habitat.—Pantallon, 1700 feet.

GENUS: ACONOPHORA.

Fairm. l.c. p. 294; Stål, l.c. Band VIII. p. 34; Fowler, B.C.A. p. 61; Walker, l.c.

A marked characteristic is the long prominent horn or porrect process of the pronotum, acute in some forms when seen from above, but flat and broad from the side view; areas of the tegmina oblong.

The species of this genus are numerous. Fowler describes twenty-seven, and Walker enumerates upwards of twenty in his lists of those in the collection of the British Museum.

Some of these are not difficult to identify, but Stål says of them: "Plurimas, difficilimas, inter se similimas, et . . . haud certe indeterminandas" (*sic*). Yet he names many species, and describes them very meagrely.

The types may be taken in *Aconophora mexicana* and *A. calliginosa.* The insects are chiefly found in Central America.

C ACONOPHORA MEXICANA.

(Plate XXVI. figs. 7, 7a, 8, 8a.)

✓ A. *mexicana*, Stål, Stett. ent. Zeit, p. 70; Fowler, l.c. Tab. V. figs. 8, 8a, p. 62.

Colour ochreous yellow, with a dark longitudinal stripe on each side of the pronotum; more or less pubescent with silvery hairs. Fowler has examined many examples from Atoyac in Mexico, but he thinks that certain specimens in the B. M. are doubtfully made to do duty for it.

Size, 11 × 4 mm.

Habitat.—Volcan de Chiriqui.

C ACONOPHORA PUBESCENS.

(Plate XXVI. fig. 9, and XXVII. fig. 1.)

Walk. Ins. Saund. Homopt. p. 70; Fowler, l.c. p. 63; C A. *spathata*, Butl. Cist. Ent. ii. p. 347.

Rather large; general colour warm fuscous; pronotum with a sharp and flat horn, and an acute posterior apex; tegmina longer than the pronotum, and pointed at the tips; surface densely clothed with a silky pubescence; the fore legs slightly spatulate, the middle pair spotted with brown.

I have placed ✓ A. *spathata* in the synonyms, as Fowler has done in the B.C.A.

Size, 12 × 6 mm.

Habitat.—Guatemala, Rio Maria Linda.

Fowler's Private Collection.

C ACONOPHORA FLAVIPES.

(Plate XXVII. figs. 2, a–b)

C *Smilia flavipes*, Germar; ✓ A. *flavipes*, Fairm. l.c. p. 294; Walk. List of Homop. l.c. p. 536.

Reddish brown, shining; pronotum with a porrect encephalic horn rounded at the top, but flattened at the sides like a knife edge, finely hirsute, brown at the tip, divided at the anterior part by a suture above the eyes, which forms on dividing a hollow cone when detached from the body; tegmina sub-hyaline greyish yellow; neuration obscure; legs yellow, rather short, hairy, not serrated, but furnished with fine black points.

Size, 15 × 4 mm.

Habitat.—Brazil.

Figured from a specimen in the B.M. Collection.

C ACONOPHORA MARGINATA, ♂.

(Plate XXVII, fig. 3.)

A. *marginata*, Walk. l.c. p. 540; C A. *concolor*, Walk. l.c. p. 540; C A. *stabilis*, Walk. l.c. Suppt p. 135; Fowler, l.c. p. 65.

Colour ferruginous; pronotum ascending into an oblique flat and compressed horn, dark fuscous at the tip; the posterior apex black; the hind tibiæ finely hirsute. The male appears to have a shorter pronotal horn than the female, and may prove to be identical with A. *concolor* of Walker, and as such it is included here as a synonym.

Size, 13 × 7 mm.

Habitat.—Guatemala, Costa Rica, Panama.

ACONOPHORA MARGINATA, ♀.

(Plate XXVII. figs. 4, 4a.)

Larger than A. *marginata* ♂, with the pronotum reaching nearly to the tips of the tegmina; the limbus to the tegmina does not appear to be so much developed as in the male, and the colour of the insect is more sombre.

The procephalic horn viewed from the front is thin and sharp, and the lower edge of the metopidium is indented above the frons.

Size, 14 × 8 mm.

Habitat.—Mexico, Brazil.

ACONOPHORA LATICORNIS, ♂.

(Plate XXVII. fig. 5.)

Walk. l.c. Suppt. p. 134 (1858); Fowl. l.c. p. 65.

Colour ochreous, with fine ferruginous mottlings; the procephalic horn more fuscous, with a central dark stain, from the rounded blunt apex to the shoulders; tegmina brownish hyaline, with marked warm brown neuration; wings pale grey; legs ferruginous with a red streak passing down the tibiæ; the last pair of which has a few black hind spurs.

The pronotum by the back view is trapezoidal in form, and shows the horn thin and pointed at the tip.

The female has a much longer pronotal horn.

ACONOPHORA LATICORNIS, ♀.

(Plate XXVII. fig. 6.)

Walk. l.c. Suppt. p. 134; Fowl. l.c. p. 65.

As the female has not the broad horn shown by the male insect, the name given by Walker is not very appropriate to both sexes. The female pronotal horn is very long, slender, and dark coloured.

The insect occurs somewhat commonly at Omilteme and parts of Mexico. In Guatemala it is found at heights of elevation from four thousand to upwards of ten thousand feet.

The pronotal horn of the female in some cases measures as much as fifteen millimetres in length. The dark longitudinal band on the tegmina will generally distinguish this species, but this mark is not always present. A considerable series of the species may be formed, from which the varieties, dependent on small particulars may be studied.

Size, 15 × 7 mm.

Habitat.—Omilteme in Guerrero to 8000 feet. Guatemala, Totonicapam, 10,500 feet. Champion.

ACONOPHORA QUADRIVITTATA.

(Plate XXVII. fig. 7.)

Say (Membracis), Jour. Acad. Philad. p. 300 (1862); Walk. *A. rubrivittata*, l.c. p. 537; Walk. *A. porrecta*, l.c. p. 538.

Pronotum viewed from the back trapezoidal in form, with a sharp and thin procephalic horn, and with sharp but small suprahumeral processes.

The colour is bright ochreous yellow, with the lower marginal edges bright red; a shorter red streak also occurs on each side of the sharp dorsal carina; the surface is much punctured; the pronotum leaves almost the whole of the tegmina uncovered, but it does not quite extend to the tips of the same; wings clear hyaline; by the profile view the procephalon appears flat, broad, and round at the top; legs ochreous yellow.

Dr. Goding places *A. quadrivittata* under the genus Platycotis, and adds as synonyms *Hoplophora lineata*, Fairm.; and also *A. guttifera*, Walk.

The side view of this insect is very like Platycotis, but the procephalon is not so erect. I have not been able to compare the neuration of the tegmina, so as to fix the genus with certainty. The wings were defective in the specimen figured in the plate.

Size, 11 × 6 mm.

Habitat.—North America.

From the B. M. Collection.

ACONOPHORA VIRIDULA.

(Plate XXVII. fig. 8.)

Fowler l.c. p. 71.

Small; colour pale yellow; pronotum rather dusky yellow in front, and marked with several faint, dusky, transverse fasciæ on the dorsum; tegmina and wings delicate and hyaline; legs pale. Doubtless the living insect takes a green shade, like many others of the group which appear yellow in our cabinets. The front view shows the head broad, and the metopidium obtuse and much punctured. Fowler says "very like OA. *palescens*," but it is broader between the shoulders, and is not testaceous or reddish in colour.

Size, 7 × 4 mm.

Habitat.—Tabasco, Nicaragua.

OACONOPHORA PINGUIS, ♀.

(Plate XXVII. fig. 9.)

Fowler l.c. Tab. V. figs. 11, 11a, p. 64.

Like a large edition of the next species, OA. *ensata*, but the procephalic horn is stouter at the tip, and the whole front is black; the pronotal ridge also is straight to the apex; the tegmina are ferruginous brown, except at their tips, which are hyaline; the neuration is reddish. Fowler says this insect is allied to *A. tenuicornis* of Walker from the Valley of the Amazons.

Size, 10 × 4 mm.

Habitat.—Bugaba.

OACONOPHORA ENSATA.

(Plate XXVII. figs. 10, 10a.)

Fowl. l.c. Tab. V. figs. 14, 14a, p. 68.

The shining black clavate pronotal horn will mark the characters of this species. Individuals vary much as to size. Seen from the back, the horn is sharp, but it is broad between the shoulders; colour ferruginous, surface punctured; the tegmina dark at their bases, but ferruginous-hyaline at their tips.

Size, 9 × 3 mm.

Habitat.—Bugaba, Panama.

Figured from the Fowler Collection.

OACONOPHORA DISPARICORNIS.

(Plate XXVIII. fig. 1 ♂.)

Fowler, l.c. p. 69.

Small, short and robust; the procephalic horn brown at the tip, truncate and short, rising conically from the metopidium and then passing backwards and slightly convexly to the apex; general colour pale brown or fuscous, with a dark brown spot (in some specimens) on each side of the pronotum; the tegmina pale fuscous, with brown neuration.

Figured from a specimen in Canon Fowler's Collection. This insect recalls OA.

ferruginea, but it is broader and more shining. The horn of the female is longer than that of the male.

Size, 7 × 3 mm.

Habitat.—Panama, Volcan de Chiriqui, 2500 feet.

O ACONOPHORA NITIDA.

(Plate XXVIII. fig. 2.)

Fowl. l.c. Tab. V. figs. 12, 12a, p. 66.

In contour not unlike the last insect described, but the coloration differs; the pronotum is much darker and more shining, with a whitish patch on the metopidium; the tegmina are dark fuscous at their bases, and they have each a broad and squarish ochreous space enclosing the apical areas and the extreme border; the legs dark ferruginous; the hind tibiæ have a dark line down their middle.

Size, 8 × 4 mm.

Habitat.—Panama, Volcan de Chiriqui, 4000 feet.

Closely allied to O*A. hadina*, Butl., and to O*A. pugionata*, Germ., which last two insects may prove to be identical.

The frons and metopidium are very pubescent.

OACONOPHORA CALIGINOSA.

(Plate XXVIII. figs. 4, 4a.)

Walk. l.c. Suppt. p. 135; Fowl. l.c. Tab. V. figs. 9, 9a, p. 62.

This is a large and handsome species, and may be considered as typical of the genus. The pronotum is black, with a shining steel-blue glance, and it quite covers the body when the wings are folded. From the back view, the anterior part is almost as acute as the posterior, and it shows a sharp carina or dorsal ridge; the tegmina are slightly fuscous and subhyaline; the areas are long and narrow, and the neuration dark brown; legs short; the abdomen greyish, plump, and distinctly segmented; the metopidium by the front aspect, and the frons below it, appear conical in form.

My figure is that of a male, with the expanse of wings equal to 19 × 12 mm.

The frons and the metopidium are thickly set with pale ochreous yellow fine hairs. The dorsal carina is continued over the front and the back edges of the procephalic process.

Size, 13 × 5 mm. Expanse, 19 × 12 mm.

Habitat.—Tobasco, Paramba, Ecuador. 3500 feet. (Rosenberg.)

O ACONOPHORA W. ALBUM, n.s.

(Plate XXVIII. figs. 5, 5a.)

Colour dark fuscous, almost black; the procephalon long, and truncate, obliquely at the top ; the dorsal ridge sinuous, with a distinct swelling in the middle followed by a somewhat blunt apex, which reaches to the tip of the abdomen ; the surface much punctured, with the outer edges fringed with a white tomentose pile ; these white stripes are united near the insertions of the tegmina, so as to form a mark like a **W**, whence the specific name.

The tegmina are concolorous with the pronotum ; each has a white dot in the disc followed by a white striga near the apex ; wings semi-transparent, smoky, with black neuration ; the abdomen dark grey ; the legs with dark femora and tarsi ; the tibiæ paler grey.

Size, with expanded wings, 16 × 8 mm.

Habitat.—Ecuador, 10,000 feet.

Rosenberg Collection.

The few species as above described form only a part of this genus, which has numerous representatives but often very partially diagnosed. Mr. W. F. Kirby has assisted in cataloguing as many as 52 species, without including others of doubtful synonymy.

Canon Fowler figures 14 species. The limits of this monograph prevent more than the names of such as do not appear in it, as figured. The works of Fairmaire, Walker, Butler, Stål, and Fowler may be consulted for further details.

Aconophora laminata, Fairm. l.c. p. 294 ; Fowl. l.c. p. 63 (1894). Mexico.
A. nigricornis, Fowl. l.c. Tab. V. figs. 10, 10a, p. 64.
*A. *gilvipes*, Stål, Vet. Akad. Handl. (2), III. (1) p. 28. Rio Janeiro.
**A. imbellis*, Fairm. l.c. p. 295 ; *A. surgens*, Walk. Ins. Sand. p. 69 ; *A. teligera*, Germ. (Smilia t.), l.c. p. 239 ; *A. teligera*, l.c. p. 295. Brazil.
A. xeiphias, Fabr. (Membracis), Syst. Rhyn. p. 12 ; *A. xiphias*, Stål, l.c. p. 34. Amer. Merid.
A. gladiata, Stål, l.c. p. 35. Mexico.
A. curvata, Fab. l.c. p. 13.
A. hastata, Fabr. (Membracis), p. 263.
A. nigrivittata, Walk. l.c. p. 539.
A. Braziliensis, Stål. l.c. p. 34. Rio Janeiro.
A. concolor, Walk. l.c. p. 510. Mexico.
A. gracilicornis, Stål, l.c. p. 35. Mexico.
A. stabilis, Walk. l.c. Suppl. p. 135. Mexico.
A. puginata, Germ. l.c. p. 238 ; *A. puginata*, Fairm. l.c. p. 295. Brazil.
A. hadina, Butl. l.c. p. 349, plate 7, fig. 18.
A. viridipennis, Fowl. l.c. Tab. V. fig. 5.
A. subinermis, Stål, l.c. p. 28.
A. nigra, Stål, l.c. p. 35 ; Fowler, p. 67.
A. compressa, Walk. l.c. p. 541 ; Fowl. l.c. p. 65. Mexico.

*A. *grisescens*, Germ. (Smilia), .c. p. 238.

A. *interna*, Walk. l.c. p. 542. Brazil.

*A. *obtusa*, Walk. l.c. Suppl. p. 134. Brazil.

*A. *lineosa*, Walk. l.c. Suppl. p. 134.

A. *lata*, Walk. In. Saund. p. 69. Para. *Thelia gladiator*, Walk. l.c. p. 567.

*A. *gigantea*, Butl. Cist. Ent. II. p. 352, Pl. 7, fig. 15. Ega.

A. *rubescens*, Walk. Ins. Saund. p. 70; Fowl. l.c. p. 63. Mexico.

*A. *spathata*, Butl. l.c. p. 347, Pl. 7, fig. 16. Brazil. Fowler says *A. pubescens* of Walker is a variety of *A. spathata*, see p. 63.

*A. *tenuicornis*, Walk, In. Saund. p. 70. Amazons.

*A. *punitia*, Butl. l.c. p. 350, Pl. 7, fig. 19; Fowl. l.c. p. 48, Tab. V. fig. 15; *A. hastata*, Stål, l.c. p. 35 (1869). Peru.

A. *ferruginea*, Fowl. l.c. p. 69, Tab. V. fig. 16 Panama.

A. *fusiformis*, Fowl. l.c. p. 69, Tab. V. fig. 18. Panama.

A. *sinangensis*, Fowl. l.c. p. 70, Tab. V. fig. 20. Guatemala.

A. *femoralis*, Stål, l.c. p. 35; Fowl. l.c. p. 71, Tab. V. fig. 22. Mexico.

A. *temaxia*, Fowl. l.c. p. 70. Yucatan.

A. *pallescens*, Stål. l.c. p. 35; Fowl. l.c. p. 71, Tab. V. fig. 23. Guatemala.

A. *viridula*, Fowl. l.c. p. 71. Mexico.

A. *obtusiuscula*, Fowl. l.c. p. 71. Mexico.

A. *minuta*, Fowl. l.c. p. 72. Mexico.

*A. *cunifera*, Butl. l.c. p. 35, Pl. 7, fig. 17. Mexico.

A. *pugnax*, Germ. (Smilia), l.c. 23 (1835); Fairm. l.c. p. 294 (1846). Brazil.

N.B.—The species prefixed with an asterisk are represented in the collection of the British Museum.

GENUS: ENTAPHIUS, n.g.

This genus has certain affinities with *Aconophora*, yet I think it may be considered distinct; its procephalic horn is short and truncate, and the tegmina have the costal areas very dense and imbricated, or at least marked by transverse sulci or furrows; the neuration differs from *Aconophora caliginosa* in the radials being more curved and the areas being less elongated; the fore tibiæ are broad, flattened, and more robust than those of the other pairs. From the funereal colour of the species now described, I name the genus from the Greek word ἐντάφιος, sepulchral.

ENTAPHIUS FUNEBRIS.

(Plate XXVIII. figs. 6, a–b.)

Colour shining black; procephalon short, truncate, with a strong carina on each side of the central ridge; the surface much sculptured with obscure furrows; the tegmina long, and exceeding the tip of the pronotal apex ; colour smoky hyaline, with a broad costal border, dense and imbricated ; limbus marked ; the neuration dark brown, with comparatively broad and short apical areas ; legs bright yellow, with broad and flattened tibiæ ; tarsi of the same colour.

My figure is drawn from a male specimen in the Fowler Collection.

Size, 9 × 5 mm.

Habitat.—Geronimo, Guatemala.

GENUS : HYPHEUS, Stål.

Öfv. Vet. Akad. fig. 24, p. 55.

HYPHEUS ALBOPICTA.

(Plate XXIX. figs. 1, 1a.)

Pronotum shining sienna brown, finely punctured with yellow. Metopidium rising obtusely from the frons to the dorsum, whence it becomes slightly swollen, and not smoothly convex as in Tropidarnis. Marginal edge sinuous, whitish, and furnished near its middle with a conspicuous white triangular spot. Surface sparsely covered with white tomentose hair. Frons pilose, and wide between the eyes. Ocelli placed in deep pits. Metopidium with two black spots.

Tegmina largely exposed, dark grey with brown rings. Hind legs rather long, and shining ferruginous.

Size, 8 × 5 mm.

Habitat.—North America.

From the Hope Collection.

Possibly this insect may represent the female of *Darnis stupida*, Walk., though he gives a smaller measurement for it.

Mr. Kirby gives me the following as some described species of Hypheus.

H. arus, Fairm. (Thelia), l.c. Pl. 5, fig. 10, p. 306. Bogota.
H. tripartita, Walk. (Darnis), l.c. p. 576. Florida.
H. stupida, Walk. (Darnis), l.c. p. 577. Nova Scotia, N. America.

GENUS : HEMIPTYCHA.

Germar, Fairmaire, Stål, Goding, Walker.

Fairmaire, Ann. Soc. Ent. de France 1845–1846 gives the characters :

Head large and triangular. Prothorax tectiform. Tarsi of the hind legs as long as those of the first and second pairs. Suprahumeral processes, if present, divergent. Tegmina elongated, often coriaceous, with parallel nervures somewhat as in Umbonia.

He describes twenty-three species, but with such varied characters that Stål erected from the group several separate genera, retaining Hemiptycha, Hyphinöe, Pyranthe, Proterpia, Euanthe, Alcmeone, and Bubalopa.

Canon Fowler doubts the sufficiency of this subdivision for present requirements, and thinks that the erection of new genera chiefly founded on the position of the ocelli, and the amount of the tegmina which appears to be covered by the pronotum, are characters too obscure for accurate determination.

He adds, however, another genus, viz., Ictaranthe, which is represented as yet, by only one described species. It appears to approach to Pyranthe with a facies somewhat like Ceresa.

Thus Hemiptycha proper does not enter into the scheme set forth in the Biologia Centrali Americana.

Walker's list of Homoptera, practically in this respect represents Fairmaire's grouping of these insects.

Several species are very like Centrotidæ, and as such they were formerly described by Germar, Burmeister, and others. The scutullum is much covered and concealed from view. The restricted genus is here located with the Darninæ.

HEMIPTYCHA PUBESCENS, var?

Walk. l.c. p. 114, Suppt.

I note this insect though it may prove to be one of the many varieties of *Hyphinöe asphaltina*. *Hemiptycha apriformis* may be another variety. Walker's insect is described as the male of *Hemiptycha pubescens*.

The pronotum is covered by a thick pubescence. The tegmina are punctured and greyish.

Habitat.—Mexico.

C HEMIPTYCHA MARGINATA.

(Plate XXIX. figs. 2, 2a, 2b.)

O
Fab. (Membracis), Mant. Ins. 2, 263, 14. C *M. sinepsis*, Germar. Stoll. Tab. II. fig. 53, and Tab. XVII. fig. 91. O *M. maculata*, Ol. l.c. 668, 5. Fairm. l.c. Pl. VI. figs. 16–17, p. 312.

Fairmaire calls this a rare species, which old authors believed to be Asiatic. It is, perhaps, the largest of the known Membracidæ, and it has been described under different names. Stoll calls it "le taureau noir." Large, rich brown, shining and abundantly spotted with small orange dots. Supralateral horns long, acute, and reflexed; dorsal ridge sinuate, and sloped to the acute posterior apex; pronotum covers much of the tegmina, but it can be easily detached, and is then seen to be hollow, and apparently filled with air; frons wide; the eyes small, ocelli placed near their inner margins; tegmina ample, with broad brown stains on the cubical margins; small tarsi, neuration showing long areas, brocaded by parallel veins.

I possess several fine examples, which are dark grey underneath.

Expanse, 35 mm., or 20 × 8 mm.

Habitat.—Brazil, Cayenne.

O HEMIPTYCHA FLAVA.

(Plate XXIX. fig. 4.)

✓ *Hemiptycha flava*, Fairm. (?) l.c. p. 314.

Concolorous ochreous yellow; superhumerals large, broad at their bases, divergent at right angles to the medial, rather reddish pronotal carina; surface deeply punctured Seen from the back, the pronotum entirely covers the tegmina, and neither head, eyes, nor legs are visible; tegmina and wings hyaline and greyish. Fairmaire's description generally agrees with the above, but my insect shows no obscure fascia at the external borders.

Expanse, 17 mm.

Size, 10 × 12 mm.

Habitat.—Brazil.

Wollaston Collection.

O HEMIPTYCHA SPATULOSA, n.s.

(Plate XXIX. fig. 3.)

Large; pronotum with two large flattened suprahumeral processes, spread and curved at the tips; a slight dorsal ridge runs to the tips of the fuscous yellow tegmina; surface shining, ochreous yellow, slightly spotted with brown, and punctured; legs short, yellow, and ending with weak tarsi.

Size, 17 × 14 mm.

Habitat.—Brazil.

Wollaston Collection.

O HEMIPTYCHA ALATA.

Fairm. l.c. Pl. VI. fig. 24.

There are several species from Silhet, parts of India, and also from Malacca, which strongly resemble the species drawn by Fairmaire as Hemiptycha. They do not, however, answer to the venation of the tegmina as shown in my plate of Hemiptycha. They also are considerably smaller, and must be referred to the Centrotinæ and will be described subsequently and figured.

For reference elsewhere the following insects may be noted :

Hemiptycha punctata = *Hemiptera cerous*, Germ. Fairm. l.c. p. 313.
Hemiptycha compressicornis, Fairm. l.c. Pl. VI. fig. 18, p. 313.
Hemiptycha expansicornis, Fairm. l.c. p. 317. Brazil.

GENUS : EUALTHE.

Stål. Öfv. Vet. Akad. Förh. 24, p. 557.

As before stated, this genus was separated from Hemiptycha to receive apparently only two species which might have better remained where Fairmaire placed them. Nevertheless, I place them here for the convenience of reference.

EUALTHE LÆVIGATA.

Fairm. (Hemiptycha), *lævigata*, l.c. p. 318. Stål. *Eualthe lævigata*, l.c. p. 25 (type). Walk. *Hemiptycha attenuata*, l.c. Suppt. Walk. *H. longa*, l.c. p. 570, Suppt. p. 144.

Habitat.—Brazil.

B.M. Collection.

EUALTHE PUNCTUM.

Fairm. l.c. *Hemiptycha*, Pl. VI. fig. 22, p. 318.

This insect must not be confused with *H. punctata*, which is much larger and has a convex dorsum.

Size, 14 × 4 mm.

Habitat.—Brazil.

Eualthe lævigata is represented in the B.M. Collection, but I have not seen *E. punctum*.

Mr. W. F. Kirby has kindly helped me as to above synonymy of this varied section of Hemiptycha.

NESSORHINUS VULPES, Am. et Serv.

(Plate XXIX. figs. 5, 5a–5c.)

Nessorhinus vulpes, Am. et Serv. l.c. p. 542, 437. *N. vulpes*, Fairm. l.c. p. 296, Pl. XII. fig. 11. *N. vulpes*, Walk. l.c. p. 542.

Pronotum with a porrected carinated process in the form of a snout, or the beak of a duck ; dorsal ridge sinuous, rising between the shoulders and then swelling into a flat hump-like process which is covered with a white pilose coat ; the ridge is carried as a sharp carina to the posterior apex ; the pronotum is free from the scutellum, which, however, is not easily seen ; tegmina, light drab colour ; membrane hyaline, fumose with brown neurations ; apical cells four, oblong discoidals two ;

fore-legs with rather flattened tibiæ; all the legs are pilose; eyes large, ocelli close to their inner margins.

My figure is of a female, showing large genital valves which cover the cutting saws within.

Size, 9 × 3 mm.

Habitat.—St. Domingo.

GENUS: SCAPHULA.

Fairm. l.c. p. 404, Pl. VII. fig. 19.

Scaphula melanocephala, Fowl. l.c. Tab. VI. fig. 15, p. 82.

Head triangular; broad between the eyes which are prominent. Tegmina free; posterior veins wavy; one small discoidal area. Posterior tarsi longer than the anterior.

GENUS: CYMBOMORPHA.

Germ. (*Smilia*) Rev. Silb. l.c. viii. p. 234 (1835). Fairm. (*Smilia*), p. 291. Stål, *aulacotropis*, l.c. Bond. viii. p. 34. Fowler, l.c. p. 11.

Pronotum arcuate, surface sculptured with fine wavy lines; tegmina subhyaline; suprahumerals none, or very obtuse. The general appearance of the members of this small genus, recalls that of Ceresa.

From κυμβη, a bowl or a boat.

CYMBOMORPHA VAGINATA ♀.

(Plate XXIX. figs. 6, 6a.)

Pronotum much arched; shining ochreous; more fuscous in front, with a fine black dorsal line on the ridge extending from the frons to the posterior apex; surface sculptured in wavy lines; tegmina subhyaline, having a brownish hue by transmitted light; radial nervures curved, but no cycloidal areas as seen in Ceresa; suprahumerals very blunt; legs stout and brownish.

I am indebted to Dr. Aurivillius for one of the type specimens in the Stockholm Museum.

Size, 10 × 8 mm.

Habitat.—Rio Janeiro.

CYMBOMORPHA RUBROPEDALIS, n.s. (?)

(Plate XXIX. fig. 7.)

Pronotum with the outline arcuate and more compressed than the last species, and with a more sinuous lower marginal border; the surface much dotted with fine fuscous; the apex of the pronotum exceeds the length of the tegmina, and is curved downwards; legs slim, red, with a fine black striga down each of the tibiæ. With some doubt I mark this as specific, on account of its clear affinity with *C. vaginata*, to which it has resemblance. Yet it differs from the type specimen lent by Dr. Aurivillius. My figure is from one of several examples in the B.M. Collection which are labelled Smilia vaginata.

The neuration fairly agrees with the engraved outline of the tegmina given by Fairmaire. The costal border is punctured.

Size with expanded wings, 14 × 8 mm.

CYMBOMORPHA PRASINA, Germ.

Stål. l.c. XXIV. p. 558 (1867). Fowl. l.c. Tab. VI. figs. 11, 11a–b, p. 80.

Very like *C. vaginata*, but less sculptured on the pronotum.

Fairm. *Smilia prasina*, l.c. p. 292.

The colour is green, pronotum compressed with the carina and the costal margin of the tegmina, brown.

Size, 9 × 5 mm.

Habitat.—Brazil.

GENUS: HETERONOTUS.

Lap. Germ. Am. and Serv. Fairm. l.c. p. 499.

Combophora, Burm.

This genus is remarkable from the globose and often spined nodules of the pronotum. The bodies of these insects are much smaller than the overhanging pronota the nodules of which sometimes are inflected. Otherwise they would much encumber the movements of the creatures. Some kinds resemble the bodies of large ants coloured brown, black, tawny; or they are striped like some of those leaping and hunting spiders which construct no silken webs.

Originally the genera Combophora and Heteronotus were included in Laporte's genus, but they seem to be diverse in form, and should be kept separate.

Head triangular, ocelli close together on the frons; eyes usually prominent; pronotum often unarmed in the males, but spinose in the females. Pronotum may be bi, tri, or quadrilobed, the ultimate node generally being the largest. The penultimate and sometimes the ultimate node, may have a strong spine on its undersurface; the suprahumerals also are thorny.

HETERONOTUS VULNERANS.

(Plate XXX. fig. 1 ♀.)

Combophora vulnerans, Germ. l.c. p. 228. *Ranatra bicornis*, Lessing. Fairm. l.c. p. 500, Pl. VII. fig. 25. *Heteronotus stipatus* ♀, Walk. l.c. Suppt. p. 155.

Colour rich purple brown; pronotum coarsely sculptured and punctured, with a creamy white, central longitudinal stripe from the metopidium backwards, and another on each side over the two suprahumeral spines, the pronotum ending in two globose lobes, the posterior expanded in profile into a broad, vertical, fish-tail-shaped process, the upper part cleft into two thorns, the lower expanded into a strong ventral spine. The middle lobe is the smallest, with a white traverse streak. A similar streak occurs on the posterior lobe; tegmina hyaline, ample, with brown costa and basal areas; legs long and reddish; hind tarsi longest; three basal, two discoidal areas, the inner one the largest, five apical areas, of which four are nearly equal and the fifth almost atrophied.

Hind legs with the longest tarsi.

Fairmaire figures the neuration of the tegmen and divides the nine species he names into two groups, viz., those species which have the pronotum longer, and those which have the process shorter than the tegmina.

Size, 10 × 4 mm.

Habitat.—Mexico, Vera Cruz, Guatemala, Panama, Brazil.

HETERONOTUS FOWLERI.

(Plate XXX. figs. 2, 2a, 2b.)

Colour fuscous grey; the fore lobe of the pronotum slightly constricted, and then behind more suddenly; the posterior lobe is sometimes attenuated when seen from the back, but it is somewhat swollen with a partial constriction into two parts; three yellowish parallel streaks occur above, which are confluent below. There are no white fasciæ on the posterior lobules; the tegmina are hyaline, slightly fuscous on the costa; the legs are pale.

I am indebted to Dr. Jonathan Hutchinson for the possession of a small collection of Membracidæ, made by the late T. W. Wollaston; from the specimens of which I have figured an example. The description given by Fairmaire of *Heteronotus flavolineatus* of Laporte does not well agree with the above. *Heteronotus Fowleri* is a larger insect, and the yellow strigæ on the back differ in number. I think this insect is specifically distinct.

Expanse, with wings, 28 × 13 mm.

Habitat.—Brazil.

HETERONOTUS INERMIS.

(Plate XXX. figs. 3, 3a.)

Lap. l.c. p. 97, Pl. III. fig. 10. *H. signatus*, Burm. l.c. p. 130, and p. 228. *Combophora reticulata*, Burm. l.c.

This insect has some resemblance to *H. bicincta*, but the form of the pronotum separates it. The ventral spine rises almost from the second instead of the third lobe of the pronotum, and the apex is much less developed; the suprahumeral horns are smaller also, and the dorsal ridge is nearly straight; general colour ochreous, with pale white streaks above the tegmina. These differences do not appear to be sexual.

Size, 12 × 5 mm.

Habitat.—Rio Janeiro.

From the B.M. Collection.

HETERONOTUS NIGRICANS.

(Plate XXX. figs. 4, 4a.)

Lap. l.c. p. 96, Pl. III. fig. 8 (1832). Fairm. l.c. p. 500 (1846).

Large. A remarkable insect and like the last described, mimicking a large, black winged ant; of the three nodes, the posterior is the largest; black, or brownish black, much pitted or sculptured; shining when seen in a strong light. The appearance is somewhat like *H. glanduliger*, which some authors have thought might prove to be the male, but Fairmaire doubts this to be a fact. The posterior lobe is furnished with a strong ventral spine; the tegmina are transparent fuscous, with richer brown on the costa and the marginal borders; a sinuous line on each side occupies the first and second nodule of the pronotum; the tegmina are much shorter than the pronotum; the abdomen greenish, and shorter than the pronotum; the last lobe is easily broken off from the peduncle of dry specimens; the insect then has much resemblance to a hunting spider; two short horns project above the suprahumerals; some examples are browner than others.

Size, 13 × 4 mm.

Habitat.—Brazil.

Wollaston Collection.

HETERONOTUS GLANDULIGER.

(Plate XXX. fig. 5.)

Ranatra glanduligera, Less. Ill. Zool., Pl. LVII. fig. 2.

Colour port-wine brown, sometimes more ochraceous; pronotum trilobed, the posterior node the largest; globose, inflated, with a small ventral spine which is white at the tip; the anterior lobe with two white marginal streaks; the second lobe with one transverse streak; the third lobe also has a streak on the anterior part; there are no suprahumeral spines; tegmina subhyaline, or smoky purple; legs brown, the hind pair the longest; abdomen sordid ochreous, ringed with brown, and about half the length of the pronotum. This insect shows different hues under different intensities of light, and the microscope does not always quite agree with those colours shown by the naked eye, they seem to be intensified. The general appearance is very ant-like.

Expanse, 11 × 18.

Habitat.—Brazil.

From the B.M. Collection.

HETERONOTUS STRIGOSA, Butler.

(Plate XXX. figs. 6, 6a.)

Heniconotus strigosus, Butl. Cist. Ent. II., p. 361 n. 9 pl. 7 f. 11 (1878).

Colour bright yellow, with light fuscous between or in front of the suprahumeral horns, which are acute and slim; a dark patch and faint dark fascia cross the anterior lobe of the pronotum, and two opposite spots occur on the middle lobe; the posterior lobe is the largest, and has one ventral and two smaller upper spines, four in all; a broad, pale-brown band transversely marks the posterior node, which is globular and semi-transparent; tegmina clear hyaline, and shining like talc; a rather large insect with black eyes; abdomen, about half the length of the pronotum.

Size, 12 × 5 mm.

Habitat.—Upper Amazon (St. Paul's).

From the B.M. Collection.

HETERONOTUS TRINODOSUS.

Butl. l.c. p. 357, Pl. VII. fig. 8. Fowl. l.c. p. 84. Tab. VI. figs. 16, 16a ♂, 17 ♀.

Dr. Butler shows that *H. quadrinodosus*, Fairm., and *H. quinquenodosus*, Stål., have been confounded with the above-named species, and Fowler identifies *H. trinodosus* with *quadrinodosus* of Walker, of which he states it is the male form. The fact of a complex synonymy points to a divergence of opinion as to what constitutes a node. I have before me a specimen from the Fowler collection, presumably *trinodosa*, with four distinct nodes, if we consider that to be one which has the two suprahumeral spines.

If the lobes refer only to the portion before the regions of the hidden scutellum, three lobes would be the correct number. The sexes of the genus *Heteronotus* are difficult to determine. Fowler admits this in his description of "what I take to be the male." The abdominal ultimate point is cleft, but I could see no indications of the valvular plates usual in the females on other specimens. The fine part of the pronotum has two moderate suprahumerals; the ultimate point has one strong thorny spine on what may be called, though inaccurately, the ventral aspect; a pale and uneven line on each side of the fore end is obscurely united below. The posterior apex is deeply sculptured, and also has two smaller divergent spines, making the spines five in number.

Size, 9 × 3 mm.

Habitat.—Chiriqui, 6000 feet.

Champion.

The following list enumerates insects not here figured, but described by others.

O**Heteronotus quadrinodosus*, Fairm. l.c. p. 499, Pl. VII. fig. 27. Butl. Cist. Ent. II. p. 356. Stål, Fowl. l.c. p. 83. Mexico.

O**H. trinodosus*, Butl. l.c. p. 357, Pl. VII. fig. 8. Fowl. l.c. p. 84, Tab. VI. figs. 16, 16a ♂, 17 ♀. Panama.

O*H. Lethierryi*, Goding, l.c. p. 453 (note).

✓*H. trinodosus*, Leth. Ann. Soc. Ent. Fr. p. 154 (1890).

O**H. bicornis*, Less. (Ranatra), Ill. Zool. Pl. LVII, fig. 1.

O*H. abbreviatus*, Fairm. l.c. p, 500, Pl. VII. fig. 26. Brazil.

O*H. nodosus*, Germ. l.c. Pl. I. fig. 2. Burm. l.c. 229 (1833). Fairm. l.c. p. 501. Brazil.

O*H. furcatus*, Gray, Griffith, An. King. p. 161, Pl. CVIII. fig. 3.

O *H. flavolineatus*, Lap. Fairm. l.c. p. 499.

O*H. inermis*, Lap. l.c. p. 97, Pl. III. fig. 10.

O*Combophora reticulata*, Burm. l.c. (1833). Brazil.

O**H. delineatus*, Walk. l.c. Suppt. p. 154. Ega.

N.B.—The species marked by an asterisk are represented in the British Museum Collection.

GENUS: COMBOPHORA, Germ.

Silb. Rev. Ent. III. p. 282 (1835). Amyot et Serv. O*Heteronotus*, Burm. Fairm. l.c. p. 504. Walk. l.c. p. 598.

Head triangular; pronotum posteriorly inflated into a spined bladder, mottled with various colours; pronotum sometimes compressed between the shoulders; tegmina free, with four apical cells, the last of which is sometimes subdivided.

Hind tarsi longer than the others.

The inflated pronotum is easily detached from the rest of the insect, which often simulates a bloated spider, or a Coccinella.

M. Beske says that the larva much resembles the perfect insect; and that he has often witnessed ants sucking the liquid which proceeds from a space between the head and the pronotum. This gland must be sought for in the recent insect.

Fairmaire describes six species all of which are inhabitants of Central or South America.

COMBOPHORA BESKII.

(Plate XXXI. figs. 1, 1a–1c, 2, 2a.)

Germ. l.c. Pl. XII. Fairm. l.c. p. 504, Pl. III. fig. 7. *Membracis cucullata*, Perty, l.c. Pl. XXXV. fig. 9. *M. inanis*, Fabr. l.c. Pl. XXXV. (1803). *M. inanis*, Stål, l.c. p. 35.

This remarkable insect, when seen in profile has much the appearance of a Coccinella (or lady-bird) or some similar beetle which it might be thought to mimic. The hemispherical pronotum is deeply punctured, and is of a strawberry red colour, with ten various sized and irregularly shaped black spots, more or less confluent.

They occur either squarish or rounded. The head and perpendicular frons is only partially covered by the pronotum, which has two oblong black streaks reaching to the eyes. The pronotum ends posteriorly in a sharp and short thorn-like process, which projects beyond the apex of the abdomen but not to the tips of the tegmina. A sharp black spur also is exserted at right angles on each side above the posterior end. The tegmina are transparent with brownish-clouded tips, and the neuration is fine and black.

Legs long, anterior tibiæ rather flattened; tarsi long.

Individuals vary much both in size, colour, and markings. The prevailing tint is some shade of red, but there are examples of semi-transparent yellow or salmon colour variously spotted with black.

At first sight these last-named insects might be thought to be distinct species, but such characters of pattern, so persistent in some Lepidoptera and Colioptera must be slightly regarded in this family of Homoptera.

The eyes of Combophora are wide apart, and the antennal organs, so rarely seen in other genera are here obvious, though small and setose.

Size, 8 × 4 to 11 × 8 mm.

Expanse of wings 22 mm.

Habitat.—Amazons, Brazil, and Central America.

(Plate XXXI. fig. 2.)

This figure represents one of the remarkable variations of *C. Beskii*, from the normal insect, above noted. It is very pale in colour.

O COMBOPHORA LAPORTI.

(Plate XXXI. fig. 3, and XXXII. figs. 1, 3.)

Germ. Silb. Rev. Ent. iii. 253. Walk. l.c. p. 599.

Concolorous ochreous yellow; pronotum more or less arcuate or domed in outline, laterally compressed between the shoulders, with a brown carinated edge; two brown strigæ over each eye; tip of the pronotum with a black point; posterior lateral, edges blunt; tegmina clouded with ochreous yellow, with a brown or yellow neuration; apical areas six, the last cellule sub-divided; legs yellow. This insect much resembles a Ceresa; the pronotum much differs in size.

Miers Collection, Hope Museum.

Size, 7 × 6 mm.

Habitat.—Brazil.

U COMBOPHORA TRIDENS.

(Plate XXXI. figs. 5, 5a.)

Smaller; pronotum almost foliaceous, therefore less inflated; dorsal edge sharp and sinuous; three spines at the posterior end, forming a kind of trident; each side with a yellow spot, like a large inverted comma; three ochreous stripes are separated by three black curved lines; tegmina shining warm brown, with black neuration; legs ferruginous yellow.

Size 7 × 5.

Habitat.—Amazons.

Bates, Hope Collection.

D COMBOPHORA CONSENTANEA.

(Plate XXXI. fig. 6, Plate XXXII. fig. 4.)

Amyot et Serv. Fairm. l.c. p. 505 (?)

Punctured, sordid ochreous yellow with irregular brown markings; more or less annular on the inflated pronotum; tegmina hyaline. Fairmaire says, with apices and bases fumose, underside with legs yellow.

Taken on the Amazon by Bates.

Habitat.—Brazil.

Size, 8 × 4 mm.

Hope Collection.

Very spider-like in appearance.

Probably this insect is synonymous with *Combophora maculata*, Guérin.

COMBOPHORA OBFUSCATA, n.s.

(Plate XXXI. figs. 7, 7a, XXII. fig. 6)

Pronotum elevated, compressed, about as long as the abdomen; hinder part with two obtuse horns, and a long slender spine between them at the posterior end. Colour brown, mottled with white, and with black and warm ochreous; finely punctured; abdomen uncovered and ringed; tegmen with a broad fuscous bar and a fuscous base; hyaline and convex, formed like two enclosing valves; legs black with yellow tarsi.

Size, 7 × 5 mm.

Habitat.—Amazons.

Bates, Hope Collection.

Other species not figured in this monograph:

C. inanis, Stål. l.c. p. 35. Central America.

**C. minor*, Fairm. l.c. p. 505.

C. discontinua, Walk. l.c. Suppt. p. 157. Size 7 mm. Ega, Amazons, Brazil.

**C. prasina*, (*Smilia*), Germ. l.c. p. 234. *Smilia lepida*, Walk. l.c. Suppt. p. 133. Fairm. l.c p. 292. Brazil.

**C. dorsata*, Fairm. (*Smilia*), l.c. p. 293. *Smilia æqualis*, Walk. l.c. Suppt. p. 133. Brazil

SUB-GENUS: ANCHISTROTUS, n.g.

Pronotum much inflated, compressed between the shoulders and carinated; posterior end globose, with a strong white apical horn, and two smaller spines; surface sculptured into wavy lines, and powdered with small stellate yellow spots; head broad, with two almost uncinate eyes, whence the name I propose for the subgenus. The ocelli are placed in deep pits on the frons; the vertex of the head shows two dark spots which resemble, but are not the true ocelli.

ANCHISTROTUS OBESUS.

(Plate XXXI. figs. 4, 4a–4c, and Plate XXXII. figs. 2 and 7.)

This uncouth-looking insect closely resembles a bloated spider. Colour dark-brown, powdered with stellate dots; the base of the middle and apical horn is fuscous; the tegmina are hyaline, with the apical part and part of the bases rich brown, the neuration dark brown and approximately like that of Combophora. Legs stout and pale ochreous.

Eyes somewhat like a kidney bean.

Size, 8 × 7 mm.

Taken by Bates on the Amazons, and figured from the Hope Collection.

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* αγιστρωτος, hooked. It has been playfully suggested to me, that *panis pruni* should be the trivial name for this insect—so like a plum-pudding.

GENUS: NASSUNIA.

Stål. l.c. p. 30 (1860). Fowler, l.c. p. 82.

Allied to Smiliorhachis, but it possesses a sharp spur on each side. The genus may be separated from Ceresa, from having long parallel apical areas, and one small single discoidal cellule on each of the tegmina.

NASSUNIA BISPINA.

Smiliorhachis bispina, Fairm. l.c. p. 290. *Nassunia bispina*, Fowl. l.c. Tab. VI. f. 12, p. 80.

Colour pale greyish-yellow, darker anteriorly; apex brown, with an oblique fuscous band on each side. Suprahumerals slender and short; tegmina transparent, with a small brown spot.

Fowler's specimens were received from Chiriqui.

Size, 7 × 3 mm.

Habitat.—Panama, Bugaba, Colombia.

NASSUNIA BISTILLATA.

Stål. Vet. Hand. III. p. 31 (1860).

B.M. Collection.

Habitat.—Rio Janeiro.

NASSUNIA FORTIS.

Walk. (Ceresa), l.c. Suppt. p. 132.

B.M. Collection.

Habitat.—Brazil.

NASSUNIA BIPUNCTATA.

Fairm. (Smilia) l.c. p. 290.

B.M. Collection.

Habitat.—Brazil.

NASSUNIA COSTALIS.

Walk. (Centrotus), l.c. p. 615 (1851).

Habitat.—Colombia.

There seems to be much similitude between the three genera, Nassunia, Dysyneritus, and Hypamastris, but Nassunia appears to have the shoulder horn the most developed.

SCAPHULA MELANOCEPHALA.

Fowler, l.c. Tab. VI. fig. 15, p. 83.

Fowler describes this insect as chestnut brown, small, shining, with a black head, Dorsum slightly rounded, but much shorter than the tegmina; abdomen brownish-testacious; legs testaceous. I have not been able to figure an example.

Size, 3 × 2 mm.

Habitat.—Panama, Bugaba.

Other species are:

S. semiatra, Fairm. *S. minuta*, Fab. (Membracis). E. India.

This monograph does not claim to be exhaustive or to describe all the species of Membracidæ noted by authors, or to give a complete catalogue of published names of species. Yet a list with some reference to the genera indicated by writers previous to Stål.'s memoirs on this family, may be useful to later workers. I add such a list of Darninæ and mark such genera as are represented in the British Museum collection up to present date. In a few years time, doubtless, new species will be recorded; and thus lengthen or curtail existing catalogues, where distinctions do or do not rise to the importance of real genera.

Stål. has been a great subdivider, and his authority appears often in this list, which has been collated from the transactions and publications of natural history societies already cited.

GENERA OF DARNINÆ.

Species in B.M.	Genera.	Authors.	Equivalents.	Species described.
4	Ochrolomia . . .	Stål.	Darnis	2
	Aspona	Stål.	Tragopa	6
5	Darnis			5
8	Stictopelta . . .	Stål.	Darnis	23
	Tropidarnis . . .	Fowl.		2
3	Cryptoptera . . .	Stål.	Darnis	4
2	Leptosticta . . .	Stål.		5
3	Hebetica	Stål.	Darnis	4
	Hebeticoides . .	Fowl.		3
	Dectonura . . .	Bult.	Darnis	1
	Alebia	Stål.		1
5	Alcemeone . . .	Stål.	Hemiptycha	7
7	Hyphinöe . . .	Stål.	Hemiptycha, Thelia . .	13
1	Pyranthe . . .	Stål.	Hemiptycha . . .	11
	Dysyncritus . . .	Fowl.		1
1	Tomogonia . . .	Stål.	Smilia, Darnis . . .	3

GENERA OF DARNINÆ.

Species in B.M.	Genera.	Author.	Equivalents.	Species described.
1	Proterpia	Stål.	Hemiptycha	1
29	Aconophora	Fairm.		51
	Entaphinus	n.g.		1
3	Hyphæus	Stål.	Darnis, Thelia	2
3	Hemiptycha	Fairm.		4
1	Nessorhinus	Fairm.		1
3	Eualthe	Stål.	Hemiptycha	5
5	Cymbomorpha	Stål.	Smilia, Thelia	3
1	Argante	Stål.	Hemiptycha	1
10	Heteronotus	Lap.	Ranatra, Combophora	9
3	Combophora	Germ.	Smilia	6
13	Heniconotus	Stål.	Heteronotus, Combophorus	
	Anchostrotus	n.g.		9
	Smiliorhachis	Fairm.	Ceresa	4
	Scaphula	Fairm.		3
4	Rhexia	Stål.		6
	Bubalopa	Stål.	Hemiptycha	2
	Paradarnoides	Fowl.		1
	Hygris	Stål.		1
4	Nassunia	Stål.	Smiliorhachis	7
1	Darnoides	Fairm.	Smilia (Horiola?)	8
1	Iria	Stål.	Darnoides?	5
	Aulacotropis	Stål.	Cymbomorpha	1
	Tetaranthe	Fowl.		1
2	Ennela	Stål.	Thelia (Walk)	5
4	Omalon?	Walk.		4
	Procyrta	Stål.		2

Before concluding the section Darninæ, a few remarks may be allowed on the question of variation and its acquired faculty of imitation. Few biological subjects have been more debated during the last few years. Though here touched upon, these remarks lay no claim to novelty.

The genera Heteronotus and Combophora furnish us with some striking examples of mimicry which call for some consideration.

The cause of variation may be perhaps of an abstract nature, and as such we may advance that, like gravitation in matter, variation is a universal law, obtaining in all living organisms, and possibly in all molecules. The processes of synthesis are met by those of analysis. Interchange and regrouping of molecules must ever be until stagnation—that is death, intervenes. The molecular groups constituting the body of an animal at birth, immediately commence a regrouping. But there is some far-reaching law, which controls this organic grouping, and keeps it from passing into what is called the elements of the inorganic world. Living forms may be regarded as molecules in a condition of unstable equilibrium.

Life is the tie which controls, varies, and binds organisms within definite channels and lines of development. Such phenomena result in variation, which phenomena however are checked by the energies at work necessary to secure the historical, if not the absolute, fixity of species. Without these first conditions, the science of zoology could not be debated.

It has been argued that variety shows itself by synthesis or accretion of parts of an organ more or less useful, or the analysis or suppression of forms which finally are atrophied as not beneficial to the animal. There may be also an abeyance for want of the presence of a suitable stimulus.

It is out of the scope of this monograph to attempt a discussion of the views of Galton, Weismann, and others, as to the bearing of heredity on variation or, on the other hand, those of Wallace, Herbert Spencer, and Semper. Well ascertained facts are the province of a classificatory treatise. Correct deductions from such facts will come best from the materials furnished and the reader's private judgment.

Struggle for the fittest will account for much variation on certain lines of utility. The protected must have advantages over the unprotected. However, the biologist has to show what are the adverse causes which are detrimental to an animal's economy, and how mimicry amongst other devices is an efficient protection.

It is asserted that all animals in a state of nature have their organs in such a state of super-abundant vigour that in cases of difficulty or necessity they can draw upon this overplus.

How far this power is under the conscious will of the animal is questionable, and how far it is checked by instinctive action. Means provided for the accomplishment of a definite purpose seem to point to design, unless we assume the clumsy expedient of a resort to blind law or necessity.

Students of the family of Membracidæ are under difficulties as to the explanation of mimicry, for at present they are ignorant of the natural enemies of the group.

Vegetable mimicry by animals may be protective, but not aggressive. Thus the genera of Sphongophorus, Bolbonota, and Pterygia simulate barks of trees, either as gnarled, smooth, grey, green, or lichen coloured. Umbonia, Triquetra, and some Centrotidæ appear, more or less, thorny like the acacia, prickly like the bramble and rose, or finely spined like the stinging hairs of the nettle. Such are vegetable representatives of the family.

When we come to the mimicry of animals the problem becomes more complex, for we must here learn or guess what are the foes against which protection is sought. The genus Darnis and Stictopelta resemble shining gramineous seeds, or else small shining slugs, which can hardly be protective against birds. The imitative faculty is well shown in the bee-forms of Hoplophora, whilst in Heteronotus and Combophora we have representations of either large ants, or ants carrying their cocoons, or of them, some copying Coccinellidæ and perhaps some Cercopidæ.

In protective mimicry the weaker prey seems to succeed in cheating the instincts of their more powerful foes, but if we were transported to the plane of an insect's life and senses, our marvels in this respect might be less than those we now think them to be.

Much has been assumed as to what is tasteful and what is distasteful to various animals. Food offered to animals in confinement is accepted by them under abnormal conditions; they are artificially fed, and so do not offer a satisfactory test. Again, we know but little of the digestive powers and predilections of such creatures. The author has known some dipterous larvæ to live for several days in a weak aqueous solution of silver nitrate (lunar caustic), and under this unusual condition their living tissues refused to be absorbed, or dyed as might have been expected by the subsequent action of light.

Dilute hydrocyanic acid is said to have very little effect on the living frog; whilst a little warm water speedily kills it. The maggot of the blow-fly revels in decomposing matter, which would prove most deadly to the higher organisations.

As to protective mimicry we ought to consider in what manner it is capable of efficiently acting.

Some exotic insects closely imitate the forms of species which seem to be absent from the countries of the mimickers. Such facts indicate some law or cause quite apart from protective mimicry, and would fall under the indefinite term coincidence, or accident, which of course is not an explanation of the fact of imitation.

If variation be regarded as a universal law of change, we may wonder that we can record so few examples of its interference. So regarded, a reversion to an ancient type might be described, not so much mimicry, as a return to the characters of resemblance, or to the habit of its progenitor.

These examples of likeness would become more frequent provided that the number of individuals born did not decrease or practically die out.

It has been shown by Dr. A. R. Wallace that diversity of sex is one prime cause of variation, and that differences once begun are accentuated by selection. He also argues that a-sexual animals have a tendency to extinction.

Opinion now tends to the belief that individuals and species do not so strongly show the peculiarities and instincts of their immediate parents as those of their distant ancestors, that is, they inherit from the ancient family stock. These views are advocated by Francis Galton, Frederic Merrifield, and more recently by Prof. E. Poulton.

Reasoning by analogy is hazardous and may be fallacious. Because the human actor intelligently simulates or mimics a king, we have no right to argue that an insect must have a quasi-intelligence to carry on its mimicry-deceits.

If it were possible to concede this intelligence, we might better explain the action of the angler or fishing frog *Lophius piscatorius* which hides in the sand and agitates its long cirri, which are developed as small silver-like fish, in order to allure its prey into its capacious and voracious mouth. Or more appositely consider the marvellous imitative faculty of some of the insectivorous Mantidæ, or again some species of the nearly allied family Phasmidæ like *Phyllium sicci-folium* which develop their elytra and legs into yellow, brown, green, or red leaf-like expansions. The imitation of half-dying leaves is complete, to the exact representation of the brown spots caused by the punctures of insects. These are striking examples of aggressive mimicry, but the subject has been already well discussed by competent writers.

It is to be regretted that many cabinets of insects fail to show, side by side, the examples of the mimickers and the species which are mimicked. In many cases this may be difficult, particularly when the habit is shown between species belonging to different orders of insects. The accurate observers, Bates, Wallace, and Belt usually were careful as to the identification of the forms they collected.

Some have argued that mimicry in animals is rather for the purpose of obtaining food than for the avoidance of enemies; but Professor Poulton, Mr. G. A. Marshall, and others, have shown that the "Mullerian" theory of mimicry admits of *different groups* of insects, copying the same distinctive markings, by way of protection against birds and reptiles. Professor Lloyd Morgan appears to think that the avoidance of distasteful forms is not instinctive, but is the result of experience, on the principle that "a burnt child fears the fire."

Mr. Arthur Balfour whilst discussing the Ethics of the Beautiful, shows that even repulsive forms may be evolved in nature. Such oddities a naturalist friend suggests, may be clumsy experiments made by some Membracidæ as the results of the efforts of creatures which have reached that stage of evolution that requires them to exert their creative or regulative force, but have failed in their attempts to improve. In other words, that they are in a transition state, and that here nature has made an attempt to supply some particular, but to us unknown want. According to the utilitarian theory, it might take centuries to produce some useful adjunct in the economy of one insect, and the causes must be continuous and in one direction. Sometimes even animals seem to acquire, or at least to perpetuate hurtful adjuncts.

The words of Huxley may be quoted, though remembered by many. They were spoken before the Darwinian epoch :

"Thus, then, natural history plainly teaches us that the utilitarian principle, valuable enough in physiology, helps us no further, and is utterly insufficient as an instrument of morphological research. . . . Regard a case of birds or of butterflies, or examine the shell of an echinus, or a group of foraminifera, sifted out of the first handful of sea-sand. Is it to be supposed for a moment that the beauty of outline and colour of the first, the geometrical regularity of the second, or the extreme variety and elegance of the third, are any *good* to the animals; that they perform any of the actions of their lives more easily and better for being bright and graceful, rather than if they were dull and plain? So, to go deeper, is it conceivable that the harmonious variation of a common plan, which we find everywhere in Nature, serves any utilitarian purpose; that the innumerable variety of antelopes, of frogs, of clupeoid fishes, of beetles and bivalve mollusks, of polyzoa, of actinozoa and hydrozoa, are adaptations to as many different kinds of life, and consequently varying physiological necessities? Such a supposition with regard to the three last, at any rate, would be absurd."

Neither can the prismatic colours of the dew-drop and the sparkle of the diamond in the hidden mine be thus explained. For the quality we call beauty comes from the appreciative mind, and so we ask, may not beauty be for beauty's sake?

Apart from the utility of mimicry (pantomiming) there seems to be some obscure love of imitation, as a pleasure for itself apart.

In by far the greater number of cases the imitation is from the less endowed to the higher. Imitation of the bad is the exception, not the rule. Its success in the long run would mark a depraved taste, and show a degredation in morals.

What is urged here is that imitation is inherent in animals, and as such it partakes of law; and, therefore, in this limited sense it is not open to argument or logical treatment.

The case is different when we come to the numerous instances of stratagem in action, and disguise for the purpose of outwitting a foe, which, on the score of utility, is an important factor in the struggle for existence.

The characters of mimicry may be ranged under the heads of Mullerism or protective, or aggressive, and Batesian, or disgustive.

The Hymenoptera are eminently an aggressive family. Yet what mimicries do we find in those that suffer, enabling them to avoid the attacks of the Ichneumonidæ? To come nearer home, what devices succeed best in animals, to help them to avoid the predatory and aggressive action of man—man who has been given dominion over every living thing? Man's intellect overrules all, but his senses are often hoodwinked by the lower animals. The hare on her form, the sea-bird with her eggs counterfeiting the stones of the beach, the crooked geometric caterpillar, and a host of other cases, prove how man and animals may be deceived by both sight and sound.

As before stated, mimicry is an important factor in the struggle for the fittest, but not the sole factor. The naturalist has to investigate how these subterfuges successfully act, and in what way they fail.

But enough has here been touched upon with reference to this highly interesting subject which is being so ably treated by others; as it is only incidentally connected with this monograph.

Sub-family: *TRAGOPINÆ.*

The small size, the shining horny exterior, and the variegated colouring of the Tragopinæ suggest to the eye some of the diminutive Coleoptera rather than species of the order of Hemiptera. One feature, however, to be noted in these Homoptera is the absence, or the rudimentary nature of the antennæ. These organs, so important in other insect orders, are almost invisible, or perhaps wholly wanting in some of the Cicadidæ, and markedly in the Membracidæ. On the other hand, the rostrum, the trimerous character of the tarsi, the ocelli, and the incomplete metamorphosis, at once will settle any doubts as to which order specimens under examination should be ranged.

The neuration of the tegmina in Tragopa is peculiar. The embolion or costal area is broad and semi-coreaceous, with two (quasi?) apical, and one large discoidal areas (see figs. 19 and 20, Plate VI. in the B.C.A.). The homologues of these cellules is somewhat difficult to fix. The peripheral borders occupy a large part of the tegmina of Tragopa.

Canon Fowler divides the sub-family into the genera Tragopa and Horiola. Stål. adds to these the genera Stilbophora, Ceratopola, and Tropidolomia.

More than fifty-three species have been recorded by authors, but with the exception of some nineteen representative species in the National Collection, chiefly comprised in the genera Tragopa and Horiola, this monograph only cites the places where other diagnoses may be found.

TRAGOPA INSIGNIS, Fowler.

(Plate XXXII. figs. 10, 10a.)

Fowler, l.c. Tab. VI. figs. 18, 18a, p. 85.

Rather large; shining and punctured, pronotum quite covering the tegmina; scutiform by the dorsal aspect; colour sordid ochreous; anterior portion black, crossed by a broad ochreous band, with a fine dark intercepted marking; a broad black fascia occurs across the lower half; apex pointed with a blunt ovipositor or tube, capable in the female of retrocession; legs short and reddish testaceous; tegmina hyaline.

This species appears to belong to the sub-genus Stilbophora of Stål.—"Fowler."

Size, 7 × 3 mm.

Habitat.—Bugaba, at 1500 feet elevation.

Drawn from a specimen in the Fowler Collection.

TRAGOPA BUGABENSIS, Fowler.

(Plate XXXII. fig. 13.)

Fowler, l.c. Tab. VI. figs. 19–19a, 19b, p. 85.

Small; shining; unicolorous, but individual specimens vary from amber-yellow, through brown, to black; humeral angles blunt and indistinct; tegmina fusco-hyaline, with a broad brown margin; legs and underside testaceous.

Size, 3 × 2 mm.

Habitat.—Panama, Bugaba.

Drawn from Fowler's private Collection.

This and the previous species is figured under the same magnifying power; the figures illustrate the apparent disproportion of size to the eye, when drawn under an increase of only double the linear amplification.

TRAGOPA SCUTELLARIS, n.s.

(Plate XXXIII. figs. 1, 1a.)

General colour warm brown; pronotum covered with numerous ochreous confluent spots or striations; shoulders wide apart and dilated; pronotum seen from above shield-shaped, with a central carina and with a dark brown stain or spot above each of the short suprahumerals. There is an insect in the B.M. Collection standing in the name of *T. fulvovaria* (Fairm.?) which has some affinity with *T. scutellaris*, but Fairmaire's description does not tally with the above (l.c. page 488). It cannot be said to be *d'un noir bronzé,* and there are no large ferruginous spots on each side.

Size, 5 × 4 mm.

Habitat.—Amazons.

CHELYOIDEA NITIDA, n.g.

(Plate XXXIII. figs. 2, 2a, 2b.)

Globose; very broad between the shoulders; much narrower posteriorly; two chitinous pronotal ear-like flaps occur above the apparent insertions of the front legs, which are distinctive of the genus.

C. nitida from the front and dorsal aspects suggests the form of a tortoise, or perhaps a shining black coccinella. Colour bronzy black, rather irridescent, but the head is of a black steel-blue. Eyes large. These and the underside of the abdomen are rufous; legs pubescent; proboscis reaches to the second coxæ. There is a single specimen in the B.M. Collection marked by Dr. Butler as *Tragopa ænea*, Fairm. syn.: *Darnis ænea*, Perty, but the single line of description is insufficient for identification with the above.

Size, 6 × 4 mm.

Habitat.—St. Pauls, Amazons.

Two specimens Wollaston Collection.

Of this sub-family Tragopinæ, I only here describe the following species. As before, those marked by an asterisk are represented in the National Collection.

Fairmaire groups these species as having pronotum strongly carinated with dilated and rounded shoulders; colour dark brown, with three testaceous fascia, or as having the shoulders angular.

**T. auriculata*, Oliv. *Darnis vespertilio*, Tab. l.c. p. 26. Stoll Cical. Pl. VIII. fig. 38 (1780), Burm. *T. auriculata*, Fairm. l.c. p. 484. Stål. l.c. p. 19 (Tropidolomia).

T. involuta, Fabr. (Darnis) Burm. Stål. (Tropidolomia), l.c. p. 20.
T. obliqua, Germ. Stål. l.c. p. 18, fig. 51. Fairm. l.c. p. 489. Brazil.
**T. fulvovaria*, Fairm. p. 488.
T. frontalis, Fairm. l.c. p. 489. Brazil.
T. albimaculata, (type) Germ. l.c. p. 252. Fairm. l.c. p. 489.
T. bistriata, Burm. l.c. p. 188. Brazil.
T. humeralis, Fairm. l.c. p. 489. Brazil.
T. globus, Germ. l.c. 252. Fairm. l.c. p. 489. Brazil.
T. bugabensis, Fowl. B.C.A. p. 85. Panama.
T. ovalis, Burm. l.c. p. 188. Para.
**T. aspera*, Walk. l.c. Suppt. p. 151. Villa Nova.
**T. scabricula*, Walk. Ins. Saund. p. 75.
**T. melanostigma*, Perty (Darnis). Brazil.
**T. bifacies*, Walk. l.c. Suppt. p. 150. Villa Nova.
**T. discrepans*, Walk. l.c. (1858). Stål. *T. morio*, l.c. p. 19. Santarem.
**T. ænea*, Perty. *T. ænea*, Fairm. l.c. p. 486. Brazil.
**T. coccinella*, Fairm. l.c. p. 489. Chiquita.
**T. dohrni*, Fairm. l c. p. 487, Pl. V. fig. 8. Santa Cruz.
**T. annulata*, Fairm. l.c. p. 487, Stål. S. America,
**T. tetyrides*, Walk. l.c. p. 580. Guiana.
**T. punctata*, Walk. l.c. p. 151, Suppt. Santarem.

GENUS: HORIOLA, Burm.

Am. et Serv. Fairm. l.c. p. 192, Pl. VII. figs. 11, 14. Fowler. l.c. p. 86.

Pronotum slightly angular between the shoulders; posteriorly pointed.

Tegmina half-covered "Quatre basilaires, la terminale du milieu formée par une nervure bifurquée, pas de discoidale."—Fairmaire.

Stoll gives a figure, apparently of a Horiola, in his Cigales tom. I., Pl. 16, fig. 89, from Surinam. The connection here between an Asiatic and American form is interesting.

Fowler says the genus is very variable, and he gives only one species in the Biologia of Central America. He thinks that many named forms should be treated as synonymous.

HORIOLA ARCUATA.

(Plate XXXII. fig. 8.)

Horiola arcuata, Fowl. l.c. Tab. VI. figs. 20a, 20b.
Darnis arcuata, Fab. *D. tincola*, Fab. *D. glabrata*, Fab. *D. elegantula*, Perty, t. 35, fig. 11.
Tragopa picta, Am. et Serv. l.c. p. 546. *Horiola lineolata*, Fairm. l.c. p. 492.

Small, more acute than the next described species *H. picta*. Pronotum dark shining brown, and marked by two conspicuous orange semi-circular rings, which do not meet at the dorsal ridge. Two smaller reversed semi-circular spots occur lower down. The pronotal apex acute, and rather orange-coloured near the tip. The legs sordid yellow. A figure of the wing neuration is given in the B.C.A. (Tab. 6, fig. 20) from which I have borrowed the above synonyms, which Canon Fowler deduced from a series from Bugaba. Stoll's fig. p. 89, which he expressly states he received from Surinam is clearly *H. arcuata*.

I have received specimens from Mr. Rosenberg which are smaller than the normal examples. They have an ochreous, angular band on each side, and a short transverse band in the middle.

Taken during the dry season at Paramba, 3000 feet elevation.

Size, 4 × 2 mm.

Habitat.—Bugaba, Bogota, Ecuador.

HORIOLA PICTA.

(Plate XXXII. figs. 9, 9a, 9b.)

Darnis picta, Fab. *Tragopa picta*, Am. et Serv.

Small, scutiform; head and eyes black and just visible from the back view; colour shining sienna-brown, with two white irregular semi-circular patches, united at the dorsal ridge so as to form a broad X-like figure; pronotal apex pale and blunt; frons broad with a white streak above. Suprahumeral processes none; tegmina half-concealed; legs yellow and shining.

The genus Horiola is very variable in its colouring.

Size, 4 × 2 mm.

Habitat.—Trinidad, Para.

Figured from the B.M. Collection.

The following may be consulted as showing examples of Horiola, in the British Museum :

H. arcuata, Fab. (Darnis). Stål. l.c. p. 22. Fowl. l.c. p. 86, Tab VI. fig. 20. S. America.
H. lineolata, Fairm. l.c. p. 492.
H. picta, Fab. *H. picta*, Fairm. l.c. p. 492. Stål. l.c. p. 21. Para.
H. biplaga, Walk. Jour. Ent. p. 318. Fairm. *H. ferruginea*, l.c. 493. Rio Janeiro.
H. strigulosa, Walk. l.c. Suppt. p. 151. Santarem, New York.
H. dorsalis, Fitch.
H. composita, Walk. l.c. p. 587. Venezuela.

Sub-family : *SMILIINÆ.*

The marvellous modifications of form seen in insects is not always effected on the side of what we may æsthetically think the beautiful ; indeed oddity and even ugliness may appear as a kind of foil to the beautiful, such as the hues of the butterfly or the brilliant sheen of the beetle. The curious but unlovely characteristics of some Membracidæ, seem to occur, fortunately for us, in some inverse proportion to the size of the insect. In imagination we might picture the horror raised by an immense flying Pterygia suddenly entering our windows, or the unexpected unearthing from our garden of a prickly and horned Centrotus, or of one of the species next to be described in this family. Even if no larger than a bat or a dog the monster in its armour might tax our ingenuity for its destruction. In geological times the Pterodactyl must have produced some such fears, which happily we do not experience now.

The Smiliinæ embrace numerous genera. Some like Cyphonia and Bocydium are remarkable for the large sperical balls attached like counterpoises to their pronota. Other forms like Ceresa have interest from their habit of secreting sacharine matter like the honey-dew of the aphides, and accordingly they are solicited by ants, which seem to be greedy of the liquid. Some species mimic the Ichneumonidæ, whilst others have the spotted characters and forms of Coccinellidæ and other beetles.

Mr. W. F. H. Rosenberg, who personally collected many species, has kindly given me a short account of the field-life of certain communities, but unfortunately during his excursions round Cachabe and Paramba in Ecuador, he did not find time to identify particular species, as connected with their special habits. He writes me, that many of the Membracidæ he met with, cluster in groups on the stems of low-lying plants, and in many cases their resemblance in colour and form, to buds on these stems, form striking instances of protective mimicry. A black and white species (which unfortunately is not named) he frequently met in clusters of a dozen or two.

As a rule they keep quite still on the approach of a human being, but on being disturbed they fly on to another part of the same plant, or perhaps to the next one. They seldom make long flights, usually only a few inches at a time; in fact their flight is more like a sudden spring from one branch to another. Often they do not take the trouble to fly on being disturbed, but merely sidle round from one part of a branch to the other, in an amusing manner.

Mr. Rosenberg continues: "I found a number of the above mentioned black and white species nestled on a certain bush one day, and I tapped the branch with my stick, causing them to scatter over the plant. The next day I saw that they had congregated again on the very same part of the same branch."

In these habits many Membracidæ seem here to imitate our small grass-flies, such as Tettigonia, Typhlocyba, and Eupteryx belonging to the Homopterous group, and not far removed from the sub-family now under description.

Some of the Smiliinæ appear metallic-golden when living, but they dry to a light brown or yellow colour. Such as possess these metallic hues recall some Cassidæ and Coleoptera, but Mr. Rosenberg says he never found these in groups, but generally they were beaten singly out of bushes or grass.

Mr. Rosenberg points out that Cachabe is on the sea-coast of Ecuador. The wide term "the Andes" of some authors does not give much help in establishing a locality in such an extensive range of mountains.

The genera Parmula, Amastris, and Hypamastris are characterised by having the apical areas of the wings (tegmina?) strongly stylate, that is pedunculate or furcate. For the use of those who appreciate the small differences shown between these genera, and the genus Ceresa, I give figures setting forth the neuration of their tegmina.

It must be confessed that so far as the neuration is concerned, the whole family of Membracidæ is complex, and the tables which have been hitherto constructed have been styled as little more than "representative *sign posts*," to assist the student, than as forming the basis of a natural classification.

The family Smiliinæ is a large one, and its subdivision has already been effected. Yet even here, Dr. Goding and others suggest a still greater sectional grouping as Cerasini, Polyglyptini, Smiliini, Telamonini, Cyphoniini, and Acutalini.

Stål.'s tables in some cases break down, and require modification, as new species are discovered. A clear nomenclature of the alary areas is much wanted throughout all the Insecta, but the lesson to be learnt from a balance of all considerations, is well nigh unattainable under present available means.

GENUS: PARMULA.

Fairm. l.c. p. 490. Ann. Soc. Ent. Fr. p. 490. Stål. l.c. p. 29.

Form rather oblong; tegmina with the membrane irregularly stained, and the areas variable as to size, the cellules shown at the extreme apex being small and stylate.

Four species are described in the B.C.A.

PARMULA DISTINGUENDA.

(Plate XXXII. figs. 11, 11a.)

Fowl. l.c. Tab. VI. figs. 21, 21a, 21b, p. 91. Fairm. *Horiola biguttata*, Pl. VII. fig. 10. Fairm. *Parmula bistrigata*, l.c. p. 491.

Small; dull, black except above the shoulders where it is shining and punctured; legs testaceous; pronotum with a wavy white band across the lower half; head large; ocelli very prominent; tegmina brown or greyish-brown with numerous pale spots of different sizes and shapes more or less reticulated; underside fuscous.

Size, 4 × 2 to 5 × 3 mm.

Habitat.—Mexico, British Honduras, Guatemala, Panama, Vera Paz.

From the Fowler private collection.

The variegated tegmen of *P. distinguenda* does not appear in Fowler's description of the species given in the Biologia.

PARMULA RETICULATA

(Plate XXXII. figs. 12, 12a.)

Fowler, l.c. p. 90. *Darnis reticulata*, Fabr. Syst. Rhyng. p. 29. *Parmula reticulata*, Stål. l.c. p. 30. *Darnis interrupta*, Fabr.

Small; very variable in size, colour, and markings, shining brown or blackish, with greyish ochreous markings on the pronotum. Sometimes appearing as a single broad punctured patch, sometimes as a lightish stripe beyond the middle.

Size, 4 × 2 mm.

Habitat.—Panama, Colombia, Bugaba.

Fairmaire adds to the genus Parmula.

P. vertebralis from Central America and *P. gibbula* from Campos Geraes. Perhaps *Horiola biguttata* should be added to the synonyms of *P. reticulata* above.

PARMULA DISPAR.

Darnis dispar, Fab. *Entylia dispar*, Burm. *Parmula dispar*, Stål. l.c. p. 29. Fowler, l.c. p. 91.

Very variable as to colour; red, orange, black, or black with yellow spots at the shoulders, or else yellow with a black head.

Habitat.—Panama, Bugaba.

O PARMULA PROMINEUS.

O*Tragopa promineus*, Walk. l.c. Suppt. p. 151. ✓ *P. promineus*, Fowl. l.c. p. 91.

A distinct species, with a large, porrect, red head.

Habitat.—Panama, Amazons, Chiriqui, 1200 feet elevation.

GENUS: O AMASTRIS.

Stal., l.c. p. 25 (1869).]

Corium, with three discoidal areas; apical area stylate.

O O AMASTRIS OBTEGENS.

Fab. (Membracis). Fowl. l.c. p. 92, Tab. VI. figs. 22a, 22b.

Colour green; tegmina hyaline; the pronotum by the side view is nearly semicircular in outline.

GENUS: O HYPAMASTRIS, Fowl.

Fowl. B.C.A. p. 92.

Fowler names six species, nearly allied to Hygris of Stål. The insects are all small; but the corium of Hygris has only two discoidal areas.

O HYPAMASTRIS SEGMENTATA, Fowl.

(Plate XXXII. fig. 14–14 a b).

Fowl. l.c. p. 93, Tab. VI. figs. 23, 23a, 23b.

Colour obscure ochreous; head broad with prominent eyes; a brown streak on each side of the pronotum joining a brown band above the ochreous apex; punctured; legs testaceous.

Colour variable, some specimens are ferruginous, and masked with yellowish blotches, other examples are grey.

Expanse 10 mm.*

Size 5 × 3 mm.

Habitat.—Chilpancingo in Guerrero, Vera Craz, Panama, Icapa.

Fowler Collection.

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* N.B.—The neuration of my figure of *H. segmentata* differs from that which is normal and given in the B.C.A.

O HYPAMASTRIS MINOR, Fowl.

Fowl. l.c. p. 93.

A small dark brown species, marbled with grey; tegmina infuscate, with thick veins.

Size, 3 × 2 mm.

Habitat.—Mexico, Icapa.

Fowler Collection.

HYPAMASTRIS ALBIFRONS.

Fowl. l.c. Tab. VI. figs. 24, 24a.

Amastris Stâlii. Goding (?)

Size, 5 × 2.5 mm.

Habitat.—Guatemala, San Geronimo, 3000 feet.

HYPAMASTRIS BRUNNEA.

Fowl. l.c. p. 94.

Larger than H. segmentata, and it has no dark lateral segments.

Expanse, 6 × 3 mm.

Habitat.—Oaxaca.

B.M. ♀.

HYPAMASTRIS VARIEGATA.

Fowl. l.c. p. 94.

Black, variegated with white, a dark mark, shaped like an hour-glass occupies part of the dorsum, behind which is a white band just above the apex.

Expanse, 6 × 3 mm.

Habitat.—Oaxaca.

B.M. ♂.

I have not met with the Genus Aphetea, Fowler, but he figures *A. inconspicua*, in the B.C.A. Tab. VI. figs. 25 and 26, ♂ and ♀, p. 95.

GENUS : CLEPSYDRIUS, Fowler.

This genus is related to Parontonaë, and also to Hypamastris.

One species *C. constridus* is also figured in the B.C.A. Tab. VII. fig. 1, p. 95.

GENUS : CYPHONIA, Laporte.

Laporte (1832). Fairm. l.c. p. 501. Fowler, l.c. p. 96.

Stål. has subdivided this original genus, and has placed the greater number of species into his genus Poppea.

Cyphonia may be known by the presence of two upright, blunt spines on the back of the pronotum above the shoulders which are not found in Poppea.

The neuration of the tegmina is very similar to that of the larger genus Ceresa, but the latter does not develop the remarkable globular masses in connection with the spines of the pronotum.

The insects are small but they are very strange and abnormal in form.

CYPHONIA TRIFIDA, Fab.

(Plate XXXIII. figs. 3, 3a, ♂, 3b.)

C. ornata, l.c. Pl. VI. fig. 4.

The male has eyes prominent; metopidium perpendicular and tuberculose; furnished with two longish suprahumerals, followed on the back by a pair of much smaller spines.

Pronotum entirely black, ending backwards with a knob, from which proceeds one long curved central horn, with a shorter horn on each side. A greyish green patch over each tegminal insertion. Abdomen large, bright orange, and ringed, each segment edged with a white border. The last abdominal segment deep black. Tegmina hyaline and shining with a broad brown transverse fascia; limbus broad; all the horns and the pronotum are very hirsute; legs yellow, with black tibial tips.

Expanse, 15 × 6.

Habitat.—Rio Janeiro.

B.M. Collection.

CYPHONIA TRIFIDA, var.

(Plate XXXIII. fig. 4, ♂.)

This species is liable to variation in size and coloration. Thus the figure I append has no conspicuous grey patch above the tegmina, and the abdominal apex is banded with brown. The fuscous bands on the tegmina are distinct. The male parts are shown at 3b.

Expanse, 16 × 7 mm.

Habitat.—Amazons.

Wollaston Collection.

CYPHONIA CLAVATA, Fab.

(Plate XXXIII. fig. 5.)

Membracis clavata, Fab. *M. bulbifera*, Germ. Stoll. Cig. p. 82, T. 21, fig. 115. *Combophora clavata*, Germ. Fairm. l.c. p. 503. Fowl. l.c. Tab. VII. fig. 2, p. 90.

Fairmaire says of this insect, "Nigra, abdomine pedibusque flavis; spinis posticis lateralibus medio inflatis, teretibus rufis apice deflexis," which fairly agrees with my figure. Stoll's figure and that of Fowler represent the body hirsute which my figure does not. The lower margin of the tegmina shows the edges dark, linear and curved, the specimen here drawn is from the B.M. Collection. Probably it is a male.

Expanse, 12 × 6 mm.

Habitat.—Amazons.

CYPHONIA CLAVIGERA, Burm. ♀.

(Plate XXXIII. fig. 6, ♀.)

Combophora, Burm. Fairm. l.c. p. 503.

Pronotum brownish-black, rough, and sculptured, with short divergent spines between the shoulders. The hinder part with a black, shining globose process from which springs two larger pyriform balls, each terminated by a black spine; (white according to Fairmaire), a longer inflexed medial spine is furnished by the central lobe. Tegmina ample, with ferruginous neuration and a broad corrugated limbus.

Abdomen and legs sordid yellow.

Size, 5 × 3 mm.

Habitat.—Para, Brazil, Patagonia, Amazons.

CYPHONIA FUSCATA, n.s.

(Plate XXXIII. figs. 7, 7a.)

Robust, concolorous brown, very hirsute; head and metopidium broad, with short divergent suprahumeral horns, which are slightly dilated (renflées) as seen in the profile, but acute by the dorsal aspect. The posterior part of the pronotum composed of three lobes, one central, which ends in a short spine, ochreous at the tip, and two lateral pyriform lobes, each ending also in ochreous thorn-like points. The tegmina hyaline, with the areas filled by convex membranes, which catch the glancing light, but have very faint nervures. The legs, or rather the tibiæ, orange. There is also a small dorsal process. The whole insect is bristly.

Figured from a specimen in the B.M. Collection which was labelled *Cyphonia clavigera*, Fab., but it can hardly be that insect, at least it is quite different from that I consider to be such.

Size, 5 × 3 mm.

Habitat.—Para, Amazons.

N.B.—As a general characteristic, Cyphonia may be separated from the allied genus Poppea by the presence of a posterior globular central bulb, from which two lateral bulbs spring and give rise to the more or less lengthy sinuous processes.

CYPHONIA JUGALIS, n.s.

(Plate XXXIV. figs. 1, 1a.)

Pronotum black, with two suprahumeral, two small dorsal, and three long posterior pronotal processes, all of which are black and densely hirsute. The rest of the body, abdomen and legs, is sordid ochreous yellow.

Tegmina ochraceous hyaline, with pale yellow neuration. At the risk of unduly multiplying species, I figure the above, which does not appear to agree with any insect described. It may prove to be allied to *C. proxima* of Fairmaire.

Size, 6 × 3 mm.

Habitat.—Amazons.

GENUS: POPPEA.

Stål. Öfv. Kongl. Vet. Ak. Förh. XXIV. p. 551.

This genus is allied to Cyphonia, both in the form of the front pronotal horns and in the neuration of the tegmina. The back part of the pronotum is expanded into a crescent-shaped process, which develops backward into three stout spines; as a rule, the middle spine is the longest.

There is no small dorsal spine as occurs in Cyphonia.

The species seems to be scarce, and are chiefly the inhabitants of Brazil or Central America.

See Fowler, B.C.A., p. 97, who describes nine species and figures seven.

Hirsuteness is a characteristic of this genus, tufts of fine hair occurring over all the pronotum, but it does not constitute a pilose coat. Like the Irishman's pig whilst undergoing shearing, there may be much cry, yet but little wool!

POPPEA SETOSA.

(Plate XXXIV. figs. 2, 2a, 2b.)

Fowler, l.c. Tab. VII. figs. 3, 3a–3c, p. 97.

Small, shining amber-yellow or brown. The pronotum hirsute with two dorsal prominences or humps, the posterior ending in three spines, the longest not reaching to the tips of the tegmina. Abdomen and legs ochreous, the last furnished with black spots at the junction of the tibia. Tegmina very shining, the membrane between the nervures being concave and reflecting the light; suprahumerals rather short. The insects in the British Museum labelled *Cyphonia hirta* should be referred to *Poppea setosa.*

Size, 5 × 3 mm.

Habitat.—Teapa, Tabasco.

Fowler Collection.

POPPEA CAPRICORNIS, Fowl.

(Plate XXXIV. figs. 3, 3a, 3b.)

Fowl. l.c. p. 99, Tab. VII. figs. 6, 6a, 6b.

Rufous, variegated with brown; tips of the suprahumerals black and stout, hirsute; the three-spined hind part of the pronotum shining black, with the lateral spines testaceous before their apices; two blunt tubercles are on the vertex just above the eyes; legs ochreous or else testaceous; tegmina with fuscous nervures.

Size, 8 × 4 mm.

Habitat.—Panama, Bugaba.

Fowler Collection.

O POPPEA MUNDA.

(Plate XXXIV. figs. 4, 4a, 4b.)

Fowler, l.c. Tab. VII. figs. 9, 9a, 9b, p. 101.

Small, uniformly shining, amber-coloured, hirsute; the abdomen rugged and paler yellow; tegmina shining hyaline and irridescent with pronounced fuscous venation; hind legs long and ochreous; fore part of the pronotum furnished with small shining tubercles. This species is very like the larger *P. capricornis*, but it shows the lateral spines of the pronotum more curved; the bases of the femora and the tibiæ are more or less marked with obscure spots.

Size, 6 × 3 mm.

Habitat.—Panama, Chiriqui, 1200 feet, Tabasco.

Fowler Collection.

O POPPEA CONCINNA, Fowler.

(Plate XXXIV. fig. 5.)

Fowl. l.c. Tab VII. figs. 7, 7a, 7b, p. 100.

Bright ochreous yellow, with the pronotum pale transparent greyish green inflated and hollow, and furnished with five curved spines; the two anterior spines erecto-divergent, the hinder process trifid, the central spine being the longest; the pronotum is tufted with fine hair; abdomen ochreous, with a middle, brown, broad, and transverse fascia; tegmina long, hyaline, and marked with fine neuration; legs rather stout, with black tips to the tibiæ and tarsi; part of the underside fuscous or black; the bases of the spines of the hinder part of the pronotum are black or rich brown, and so also are the tips.

Size, 8 × 3 mm.

Habitat.—Panama, Volcan de Chiriqui, 1500 feet, Bugaba.

Fowler Collection.

O POPPEA RECTISPINA.

(Plate XXXIV. figs. 6, 6a, 6b.)

Cyphonia rectispina, Fairm. l.c. p. 502 (?) Fowl. l.c. p. 99.

Large; pronotum very rugose, and more or less covered with minute tubercles; the dorsal ridge quite straight, furnished with stout suprahumeral curved horns; the trifid posterior process has three almost straight horns, the middle one much the longest; colour of a reddish ochre, much corrugated and stippled with lighter dots;

two small tubercles like shining pearls are seen above the true eyes; the tegmina are long, hyaline, but greyer towards their bases; neuration brown and fine.

Canon Fowler remarks, this species may be known by its large size, by the glabrous disc of the pronotum, and by the nearly straight spines of the posterior process.

My figure is from a broken specimen from the Sallé Collection, and it wants the abdomen and the legs. It does not, however, seem to be that noticed by Fowler, as the suprahumeral horns are intact, as shown in my drawing. It also somewhat differs from the brief description given by Fairmaire. It is allied to 0*P. affinis*.

Size, 9 × 4 mm.

Habitat.—Guatemala, San Juan in Vera Paz, 4000 to 5000 feet (Champion).

0POPPEA SUBRUGOSA, Fowl.

(Plate XXXIV. fig. 7.)

Fowl. l.c. Tab. VII. figs. 5, 5a, 5b, p. 99.

A robust species with the pronotum tumose, punctured, and showing the tri-spined posterior portion ochreous, and banded with black; the central spine is the longest and most slender; the side spines short, with fine points; legs yellow; points of the tibiæ brown; finely hirsute.

Size, 9 × 5 mm.

Habitat.—Colombia, Guatemala, 5000 feet.

B.M. Collection.

I have not seen

0*Poppea torva*, Fowl. l.c. Tab. VII. figs. 4a, 4b. p. 98.
0*P. affinis*, Tab. VII. fig. 8. Fowl. l.c. p. 100.
0*P. reticulata*, Fowl. l.c. p. 101.

All these are species from Central America.

0 GENUS: CERESA.

Am. et Serv. 1*Ceresa*, Fairm. l.c. p. 283. Fowler, B.C.A. l.c. 102. 0*Smilia*, Germ. l.c. p. 235.

Pronotum compressed, sub-arcuate, posterior end acute; suprahumerals prolonged into horns more or less long. Tegmina transparent, with the areas rhomboidal in shape; the last apical area stylate.

A rather numerous group composed of forty or more species, some of which inhabit districts ranging from Nova Scotia to Buenos Ayres.

Some species like *Ceresa bubalus*, attack the plants and crops of the agriculturalist and are said much to injure the potatoe.

Roughly the group may be divided into species which have slender horns proceeding from the shoulders, and into those which show them stouter and somewhat curved. The group is not easy, satisfactorily to diagnose.

Stål and others form certain allied genera from the wing neuration, but it is not easy to decide as to which should be counted the discoidal, and which are the basal cellules. Ceresa is described as having five apical and three discoidal areas. Stictocephala and Centrogonia externally show little differences from Ceresa; and are separated from it chiefly by neuration of the tegmina, if coloration be disregarded in the classification of these Homoptera.

O CERESA AXILLARIS, Fairm.

(Plate XXXV. figs. 1, 1a.)

Fairm. l.c. p. 285. Germ. (Smilia). O *C. terminata*, Walk. l.c. p. 531. ✓ *C. terminata*, Fairm. l.c. p. 287.

Rather large; very shining in colour, like that of the carnelian-stone; lower margin of pronotum paler; finely pubescent; suprahumerals divergent and at right angles to the dorsal ridge, and when seen from the back triangular in shape; hind-legs long and pilose; tegmina pale ochreous and shining hirsute; neuration coarsely rhomboidal, and raised above the membrane. This insect approximates to Fairmaire's description of *C. axillaris*, but it certainly is larger than 9 mm.—the measurement given by him.

From the B.M. Collection.

Size, 11 × 6 mm.

Habitat.—Amazons, Brazil.

O CERESA DICEROS.

(Plate XXXV. figs. 2, 2a, ♀, 3, 3a, ♂.)

Fairm. l.c. p. 285. O *Smilia diceros*, Germ. O *C. post fasciata*, Amyot, Pl. X. fig. 3. Walk. l.c. p. 527

Shining sordid brown or ochreous; pronotum with an obscure dark band near the dorsum, and another near the hinder apex; frons rufous with the metopidium perpendicular; finely hirsute, the hairs extending in the male over the dorsum.

Size, 9 × 5 mm.

Habitat.—Nova Scotia, New York.

This insect resembles O *C. nitidalis*, but it is stouter as to the suprahumeral horns, and is redder in front; it also is larger. It is said to be infested with the parasite *Leptus hispidus* of Say. The insect is not included in the B.C.A.; perhaps its range is too far north.

Figured from the B.M.

The female is drawn from an example collected by Heyne, though I have specimens from New York from the Wollaston Collection; but these are not pilose.

D CERESA BUBALUS, Fab.

(Plate XXXV. figs. 4, 4a.)

O *Centrotus bubalus*, Fab. Walk. l.c. p. 531.

Pale brown or ochreous, with fine dark punctures and with an obscure streak on the pronotum; tegmina clear hyaline, with raised ochreous nervures, enclosed rhomboidal areas; suprahumerals short and stout; blackish at the tips. Fairmaire notes that *Centrotus bubalus* probably is *Ceresa diceros*, or it is very near it. My figure is from a specimen in Mr. Rippon's Collection which closely agrees with several examples marked *Centrotus bubalus* in the British Museum.

Size 9 × 5 mm.

Habitat.—North America.

Mr. Ernest Green of Peradeniya, Ceylon, published in the Entom. Month. Magazine for August 1900, an interesting paper on the attractive properties of certain larval Hemiptera. He further published in June 1901, a memoir on the extensile organ of the larva of a Centrotus. He identified this species as *Centrotus bubalus* and subsequently he obligingly forwarded me specimens preserved in weak alcohol.

Mr. Green correctly calls this insect Centrotus, but the specific name can hardly be *C. bubalus*, which Fairmaire and others point out is a true Ceresa, and as far as I know is a genus exclusively American.

Some examples of the genus Ceresa are very like some short-horned Centrotidæ, and except from the isolation and distances of the Old and New World continents, at first sight it would be difficult to separate some mixed species, say Smiliinæ and Centrotinæ.

It is to be regretted that a less obscure character of the Centrotidæ cannot be found, than that of the masking of the scutellum by the overhanging pronotum. Old and New World species have each their peculiarities, and these may be grasped as a whole, yet they almost preclude an exact definition.

When the subdivision Centrotinæ is described, Mr. Green's species will come under notice; but there I propose the new name of *Centrotus nectaris* in exchange for *Centrotus bubalus*, and retain that of *Ceresa bubalus*.

C CERESA VARIABILIS, Fowler.

(Plate XXXV. figs. 5, 5a.)

Fowl. l.c. p. 105.

Castaneous brown, shining; pronotum more or less clouded, with the dark fuscous surface indented and finely punctured; suprahumeral horns short; tegmina shining and irridescent like mica, with brown neuration; legs pale fuscous.

Some specimens differ so much from others, that some entomologists might suggest specific characters and count the insects as distinct. Walker describes thirty-three species in his list comprised in the British Museum Collection. The undue multiplication of species is very confusing, and it is probable that some on his list will be found not to stand.

My figure is one from a series in the Fowler Collection.

Size 10 × 4 mm.

Habitat.—Volcan de Chiriqui to 4000 feet, Panama.

CERESA MINOR (var. *vitulus?*)

(Plate XXXV. figs. 6, 6a.)

Fowl. l.c. p. 103.

Ceresa minor is a very variable species, and the above small form appears to be common in many localities, such as North Yucatan, Teapa in Mexico, Cachabon (*sic*), and Vera Paz.

Its colour is uniformly ochreous or ochreous brown, shining, with the pronotum smooth and arched at the back, and slightly dappled with pale spots; the tegmina rather short, but longer than the pronotal apex.

If regarded as a variety of *C. vitulus*, the synonyms given under that species may be consulted.

Size, 7 × 3 mm.

Habitat.—Central America, Mexico; Tabasco, North Yatacan.

CERESA DUBIA.

(Plate XXXV. fig. 7.)

Fowl. *variabilis*, *C. intermedia?* l.c. p. 105.

Variable in colour and in the distinctness of the punctuation; ochreous orange, brownish red, or greyish ochreous; very shining; a distinct pale carina from the eye to the dorsal ridge, and with a whitish lower marginal edge; tegmina talc-like with inconspicuous yellowish nervures; legs ochreous.

This is a difficult species to certify, and it may prove to be one of the many forms of Ceresa, the varieties of Fowler, or of *C. rubescens* of Butler. There is a specimen marked *C. dubia* in the Fowler Collection, and I figure it amongst several others I have, and which are very like it.

Size, 7 × 3 mm.

Habitat.—Teapa, Tabasco.

CERESA VITULUS, Amyot et Serv.

(Plate XXXV. figs. 8, 8a.)

Ceresa vitulus, Amy. et ser. l.c. p. 540. *C. curvilinea.* *C. excisa*, Walk. Ins. Saund. p. 68. *C. minor*, Fowler (var?).

Small, very shining ochreous yellow or amber brown, immaculate, but sometimes examples occur with a pale streak on the pronotum; tegmina clear hyaline, shining like talc, with yellow nervures; abdomen large, ferruginous, and ringed; legs long, particularly the hind pair, the tibiæ of which are pilose; hind tarsi longish; suprahumerals short and stout. This species is variable, both in size and colour; some are of a greenish hue.

Size, 8 × 4 mm.

Expanse, 19 × 7 mm.

Habitat.—Guatemala, Panama, Rio Janeiro, Cayenne.

In the Godman-Salvin Collection there is a long series obtained from different localities; their variations probably are dependent on climatal and other surroundings. Some of these modifications, such as *C. minor*, may be classed under *C. vitulus*. See B.C.A., p. 103.

CERESA NIGROVITTATA, Fowler.

(Plate XXXVI. figs. 1, 1a.)

Fowler, l.c. p. 104, Tab. VII. figs. 12, 12a. *C. alta* (?), Walk. l.c. p. 529.

Colour shining ochreous yellow, dotted with reddish fine punctures; the pronotum is covered with small pentagonal-shaped spots, which seem to be distinctive. Dorsal ridge with numerous brown dots; suprahumerals sharp, not much developed, and not tipped with black; tegmina hyaline with yellowish neuration; legs yellow and slightly hirsute. This is a large species, which Fowler remarks is very distinct. It might prove, however, to be *C. bifasciata* of Fairmaire, though this latter insect is double the size. The triangular form of the metopidium is given in fig. 1a of this plate.

Size, 8 × 6 to 10 × 6 mm.

Habitat.—Chontales, Vera Paz, Nicaragua.

CERESA ALTA, var.

(Plate XXXVI. figs. 2, 2a.)

Walk. l.c. p. 539, ♀.

A comparison of *Ceresa nigrovittata* with *C. alta* of Walker leads me to the supposition that they may be identical species, although there are differences, particularly as relate to the position and size of the black pronotal band. A more complete microscopic examination may prove which insect should have the priority. *C. alta* does not occur in the synonyms of the B.C.A., but the *habitat* of Walker's insect is not given in his list. For comparison I figure these insects, both which are large for their particular genus.

Size, 8 × 6 mm.

Habitat.—?

From the B.M. Collection.

CERESA NITIDALIS, n.s.

(Plate XXXVI. figs. 3, 3a, 3b.)

Very shining, globose; colour uniformly sordid ochreous, with the fore part browner; tegmina short; membrane clear hyaline, with five more or less rounded apical cells, and oblong sinuous discoidal areas; pronotum free at the apex, furnished with two short obtuse and inconspicuous suprahumerals, most easily seen from the front; dorsal outline rounded, and ending in a sharp posterior process; the scutellum covered; hind tarsi the longest; frons bounding the metopidium by a sinuous suture; pilose; marginal edge of pronotum irregular; the neuration of the tegmina is brown, and seems to be abnormal.

Size, 9 × 5 mm.

Habitat unknown.

Heyne Collection.

CERESA TESTACEA.

(Plate XXXVI. figs. 4, 4a.)

Fairm. l.c. p. 284. *Ceresa patruelis*, Stål. Stett. ent. Zeit. p. 69. *C. Stålii*, Butl. l.c. Cist Ent. ii.: p. 217, t. 3, fig. 11.

Large; colour bright ochreous and punctured; the dorsal ridge more or less arcuate in some examples, but less circular in others; the horns short, and inclined to rufous colour. Fairmaire states that the dorsal edge is black. This character is variable. Tegmina transparent grey, with fine venation; eyes large. Widely spread over Central America. Volcan de Chiriqui.

Size, 12 × 7 mm.

Fowler gives as probable synonyms of *Ceresa testacea*, *C. cavicornis* (Stål), *C. fastidiosa* (Fairm.), *C. alta* (Walk.).

He also thinks that *C. alta* may be allied to the North American species *C. taurina* and *C. constans*.

He examined Signoret's types which were used by Fairmaire for his descriptior of *C. testacea*, and he found them to vary considerably.

GENUS: STICTOCEPHALA (Stål).

The chief reliable difference between this genus and Ceresa appears to consist in the form of the last abdominal segment of the male, which in Stictocephala shows the styles much shorter than the same parts of Ceresa. Our present knowledge of the group, however, is very unsatisfactory, and the examples available are as a rule too faded to give clear diagnosis of species. All the known examples are from localities in North America. Typical drawings of the genetalia are much wanted. Unfortunately my materials are too scanty to supply these details.

O STICTOCEPHALA INERMIS.

(Plate XXXVI. figs. 5, 5a, 5b.)

Pronotum convex and without any suprahumerals; metopidium high and subacuminate; finely punctured, and with a feeble central carina; abdomen large, ringed with pale orange red; eyes grey; tegmina and wings transparent, with orange neuration much on the type of Ceresa, if not identical with it; legs pale brown, the two first pair hirsute.

Stål separates Stictocephala from Ceresa chiefly from the unarmed character of the pronotum, but Fowler says the genetalia differ, and this might be a sufficient reason for generic separation, though it might merely point to specific variation. General colour dull orange yellow.

Size, 6 × 4 mm.

Habitat.—Trenton Falls, North America.

OSTICTOCEPHALA SEMI-BRUNNEA, n.s.

(Plate XXXVI. fig. 6.)

Aspect very similar to the last described species, but the fore part of the pronotum is of a rich brown, as is also all the underside; tegmina fusco-hyaline, with a broad crinkled limbus; legs ochreous and concolorous with the hinder part of the pronotum.

From the collection of T. V. Wollaston, Esq.

Habitat.—New York.

OSTICTOCEPHALA LUTEA, Stål, var.

This insect is very like a small example of O *S. inermis*, but notwithstanding its small size, the locality, Trenton Falls, New York, might be some argument for its separate identity. Still in want of further particulars and proof, I hesitate to consider it distinct, though it is labelled *lutea* in the National Collection at South Kensington.

Taken by Mr. E. Doubleday.

Size, 4 × 3 mm.

GENUS: O CENTROGONIA, Stål.

The species of this genus are exceedingly like those of Ceresa or Nassunia. It includes O *Ceresa ciliata*, of Fairm., *P. nasala*, Stål, O *C. unguicularis*, Stål, and O *C. elegans* of Fowler. Tab. VII., figs. 16, 16a, p. 107.

O CENTROGONIA MACULATA, n.s.

(Plate XXXVI. figs. 7, 7a.)

Pronotum smooth, unarmed, and without suprahumerals; surface variegated with grey blotches and a conspicuous red stain on the dorsum near the apex; tegmina clear hyaline with yellow nervures; legs ochreous and stout; the pronotal lower margin is straight, not sinuous as in *C. elegans.* My figure is from the Wollaston Collection and shows the fine antennæ, so rarely seen in the Membracidæ.

Size 8 × 12 mm.

Habitat.—New York.

Wollaston Collection.

GENUS: PHACUSA, Stål.

Fowler, l.c. p. 111.

Allied to Acutalis but more elongate. The tegmina have one discoidal and five apical areas.

PHACUSA VARIATA, Fowler.

(Plate XXXVII. figs. 1, 1a.)

Pronotum long and acute; colour testaceous, with a brownish patch above the head, paler in the region of the dorsum and dark fuscous at the apex; tegmina hyaline with the base darker and often with an oblique dark stain at the apex; legs pale.

Size, 7 × 3 mm.

Habitat.—San Geronimo, Mexico, from 3000 to 10,000 feet elevation.

Six different synonyms are named in the B.C.A., viz., *P. flavomarginata,* Stål, Tab. VII. fig. 19; *P. pallescens,* Stål; *P. major,* Fowl., Tab. VII., figs. 20, 20a; *P. variata,* Fowl., as above; *P. dubia,* Fowl.; and *P. lineola,* Fowl., Tab. VII., figs. 21, 21a.

The single discoidal area of the tegmina of these species is not always distinctly marked. Some of these cannot be regarded as distinct, with complete certainty.

GENUS: EURITEA.

Stål, l.c. xxiv. p. 552. Fowler, l.c. p. 112. *Euritea fasciata,* n.s.

Uniformly dark brown almost black, very shining with the tegmina pale, smoky-brown, and having a whitish patch above the costal margin; nervures fuscous; antennæ obvious. I have figured a specimen from the B.M. Collection marked Centrotus, though it appears to belong to either the above genus, or to Phacusa its near ally.

The legs and the whole underside are grey fuscous; the frons and metopidium agree pretty closely with the figures given in the B.C.A.

Size, 6 × 4 mm.

EURITEA CAPITATA, ♀ n.s.

(Plate XXXVII. fig. 3, Plate XXXVIII. fig. 3.)

Pronotum arcuate in outline, tapering to an acute apex, colour sordid ochreous. Abdomen more orange in colour and marked by segmental rings; tegmina ample, membranes smoky, with brown at the bases and the neuration. A whitish carination rises from the metopidium and continues down the dorsum; the neuration of the specimen which is drawn from the Rosenberg Collection, is somewhat abnormal, but the insect I refer to Euritea.

Expanse, 18 × 7 mm.

Habitat.—Cachabe. Ecuador.

GENUS : O ACUTALIS, Fairmaire.

Ann. Soc. Ent. Fr. Sér. 2, iv. p. 496. Fowler, l.c. p. 113.

Fowler limits the species, which he describes, to those examples of Fairmaire's group which have five apical areas in the tegmina, and no discoidal area. He separates Micrutalis, which certainly has only four apical areas. Micrutalis seems to merge however into Acutalis; only a single figure of which, viz., *A. nigrinervis* is drawn in the B.C.A. and this appears to have four not five apicals. Fairmaire says that "often one of the five terminal cellules in (Acutalis) is atrophied," and he gives for the figure of the tegmina, 18 and 19 Pl. VII.; but Fowler says fig. 19 really represents Micrutalis, and that figure 20 is properly Acutalis, though Fairmaire ascribes the neuration to Scaphula.

The insects comprised in these two genera have certainly different facies, yet it is doubtful if Micrutalis should have generic rank, until more material is available. But in this classification I think it best to follow that adopted in the Biologia.

O ACUTALIS NIGRINERVIS.

(Plate XXXVII. figs. 4, 4a, 4b.)

Fowl. l.c. Tab. VII. figs. 24, 24a, p. 114.

Black, shining, with the front part of the head, a band above the forehead, and a lateral stripe on each side of the pronotum yellowish-white. These side bands are united to the band above the eyes; punctured, eyes ferruginous red; tegmina hyaline, with thick and strongly marked brown neuration, with four apical areas; legs pale, testaceous, hind-pair serrated; tegmina warm fuscous at their bases; underside dark.

Size, 5 × 3 mm.

Habitat.—Vera Cruz, Orizaba, Atoyac.

O ACUTALIS FLAVO-NERVOSA.

(Plate XXXVII. fig. 5.)

Shining ochreous yellow, with a dark patch above the pronotum and brown at the apex; tegmina hyaline with pale yellow neuration showing obscurely five apical areas;

legs ochreous. It is difficult to say if this insect is or is not *A. fusconervosa*, Fairm. Examples, so far as form goes, run much into *Phacusa pallescens*, whilst others occasionally occur darker, like *A. nigrinervis*, last described.

Collectors on the spot alone can decide if such are found in mixed companies of the live insects.

Size, 6 × 3 mm.

Habitat.—Chilpancingo.

ACUTALIS LUCIDUS, n.s.

(Plate XXXVII. figs. 6, 6a, 6b.)

Much larger than the last species; pale testaceous and very shining; concolorous except a brown dotted spot above the frons, with a brown line on each side of it on the metopidium; eyes grey; the intermediate space on the frons has also an irregular wavy line and a slender one above the rostrum; the tegmina pale stramineus, with faint nervures and a corrugated limbus; the wings have four apical areas.

Size, 8 × 4 mm.

Habitat.—Bolivia.

Wollaston Collection.

GENUS: MICRUTALIS, Fowler.

Fowl. l.c. p. 116.

Four apical areas, and as a rule, no discoidal cellules. The veins of the hyaline tegmina are very fine, and difficult to distinguish, particularly where the tegmina are partly coriaceous, but there are species which exhibit the nervures more distinctly. Some of these species are amongst the smallest of the Membracidæ.

MICRUTALIS BALTEATA, Fairmaire.

(Plate XXXVII. figs. 7, 7a, 7b.)

Acutalis balteata, Fairm. l.c. p. 496. Fowl. l.c. p. 116.

Colour variable. Fairmaire describes this species as black, with one forward and two lateral lines joined behind, and also an interrupted line on the head, yellow; abdomen yellow; the sides of the chest and the anus black; legs yellow; tegmina transparent and slightly yellow; seen from the front the eyes are large and connected by a white line, and another line encircles the attachment of the rostrum. This insect is rather large for the genus.

Size, 6 × 3 mm.

Habitat.—Columbia, Panama.

MICRUTALIS PALLENS, Fowler.

(Plate XXXVII. figs. 8, 8a.)

Fowl. l.c. 118.

Uniformly testaceous or else pale ochreous, finely punctured; head and hind part of pronotum darker; eyes red, broad between the shoulders, which are rather prominent; abdomen pale yellow, and banded; tegmina and wings clear hyaline and obtuse in outline.

Size, 3 × 2 mm.

Habitat.—Mexico, Teapa in Tabasco.

This insect might prove to be a variety of *A. binaria*, Fairm.

MICRUTALIS BINARIA, Fairmaire.

(Plate XXXVII. fig. 9.)

Acutalis binaria, Fairm. l.c. p. 496. Fowler, l.c. p. 117. *Micrutalis mutabilis* var.? Fowler *Acutalis mœsta*, Stål, l.c. p. 33. Rio Janeiro.

Fore part of the pronotum very shiny black, and the hind part pale sordid yellow; the thorax also black; tegmina clear hyaline except at the basal portions, which are black and more or less conspicuous; limbus broad and crinkled.

Fairmaire's description might seem easy for the identification of this species, yet it is not surprising that specimens culled from the immense areas comprised in Columbia, Mexico, Guatemala, Nicaragua, and Rio Janeiro, should vary both in colour and size. Canon Fowler discusses these variations at some length, but he leaves much doubtfulness as to the discrimination of species, and even genus.

My figure is from Teapa in Tabasco, but I have also examples from Columbia through the Heyne and the Rosenberg collections.

Size, 3 × 2 mm.

MICRUTALIS STIPULIPENNIS, n.s.

(Plate XXXVII. figs. 10, 10a, 10b.)

Concolorous black, shining, and coarsely punctured; tegmina greyish, with faint yellow neuration, and stippled with black; underside black; legs yellow.

Size 4 × 3 mm.

MICRUTALIS MINUTUS, n.s.

Wing small, broad between the shoulders, pyriform, black and shining, not punctured, suprahumerals small; tegmina orange-yellow, but dusky at the tips; legs short, black, and with yellow tarsi; eyes large.

Size, 3 × 1 mm.

Habitat.—Cachabe (Rosenberg), Ecuador.

TRACHYTALIS ISABELLINA, Fowler.

(Plate XXXVIII. figs. 1, 1a–c.)

Fowl. l.c. Tab. VII. figs. 25, 25a, p. 115.

Distinguished from Micrutalis by the large central discoidal area of the tegmina, and by the long posterior process of the pronotum, which reaches as far as the tips of the tegmina.

The above species is of a dark dun colour, more or less mottled with brown and densely punctured. The tegmina are transparent, with the margin near the base brownish and punctured; legs fuscous.

Figured from Canon Fowler's private collection.

Size, 5 × 2 mm.

Habitat.—Mexico, Chilpancingo, 4000 feet; and Orizaba.

TRACHYTALIS DISTINGUENDA.

Fowl. l.c. p. 115.

By description very like the preceding; lighter in colour, but with a more sinuous margin to the dorsum.

Habitat.—Cuernavaca, in Morelos.

GENUS: POLYGLYPTA (Burm).

Fairm. l.c. p. 296. Stål. Walk. l.c. p. 542. Fowler, l.c. p. 121.

Fairmaire describes eleven species of this remarkable genus, all of which hitherto have been found in Mexico and parts of Central America.

The claims to some of these to be true species may be doubted. One chief character employed by former authors for distinction, is the number of parallel ribs or carinæ on the pronotum, called by some costæ. These may be counted as three, four, or five, on each side of the central carina. But there is some difficulty in deciding the character of the lower pronotal margin, which may easily be confounded with the true carinæ of the tegmen.

Canon Fowler states that more than two hundred specimens are comprised in Messrs. Godman and Salvin's Collection from Central America; but these examples run much into one another, and also show such variability, that Canon Fowler thinks they may be ranged into not more than four or five species.

The greatest number of synonyms range themselves under the heads of *Polyglypta costata* and *Polyglypta dorsalis.*

I have ventured to figure more than five species, but there must be many more undiscovered. It is difficult to say what is a species, where neither colour, markings, size, nor form are accepted as certain guides. We must hope for greater certainties, when the habits and field economics of these insects become better known.

The comparatively simple neuration of the tegmina of this genus may be noted. It is much less complex than in Ceresa, though both genera are ranged under the same sub-family Smiliinæ.

POLYGLYPTA MACULATA, Burm.

(Plate XXXVIII. figs. 3, 3a, 3b.)

P. maculata, Fairm. l.c. p. 297. *P. flavo-maculata*, Am. et Serv. l.c. p. 541, t. 9, fig. 9. *P. dorsalis* var. Stål, l.c. p. 240.

Fusiform; dark brown in colour, with two broad yellow shoulder patches on each side, and two smaller yellow patches near the posterior part of the pointed pronotum; the horn in front is slightly curved upwards; the male and female much resemble each other; the carinæ are difficult to count, and number from nine to eleven; the sulci between these ribs are deeply pitted; the pronotum almost wholly covers the tegmina, which are ferruginous; legs ochreous yellow; eyes large; tegmina hyaline, but fuscous at the costa.

Size, 15 × 3 mm.

Habitat.—Mexico, Orizaba, Colombia, Bogota.

POLYGLYPTA STRIGATA, n.s.

(Plate XXXVIII. figs. 4, 4a–c.)

In general appearance like *P. maculata*, but the yellow patches are restricted to a broken bright yellow carina over each of the shoulders, and a shorter stripe above it; pronotal horn straight and pointed; there are three side carinæ and one central, but the number perhaps is not constant; lower part pilose at the base of the rostrum; the eyes are just seen from the dorsal aspect; legs dark brown, with yellow tarsi; tegmina entirely dark fuscous.

Size, 15 × 3 mm.

This insect from the Wollaston Collection has a label "Java" affixed to it; but this locality seems to require confirmation; otherwise, it is unnamed.

POLYGLYPTA DORSALIS, Burm.

(Plate XXXVIII. fig. 5.)

Fowl. l.c. Tab. VIII. figs. 5, 5a, 5b, var. (?) *Polyglypta dorsalis*, Burm. l.c. p. 178. *P. sicula* Am. et Serv. *P. pallipes*, Burm. *P. nigella*, Fairm. l.c. p. 298. *P. fusca*, Butl. *P. hordacea*, Butl.

From these synonyms, given in the B.C.A., we may see the present difficulty of deciding what are species. Fowler even thinks that *P. maculata* (Fairm.) and *P. tricolor* (Butl.) ought to be included in the list.

General colour ochreous yellow; pronotum with one central and four shining parallel and lateral carinæ; dorsal ridge dark brown or black; on each side black stains, which on a general view suggest three circular marks, like rings; tegmina with dark ashy membranes, and with paler nervures; legs bright ochreous; the hind pair longest, clothed with yellow pubescence; the hind tarsi are the longest; all the sulci between the carinæ are deeply pitted or punctured.

This insect has much resemblance to *P. bogotensis*, and might prove to be the female, but I could not settle the sex with the material before me.

The habitats range from Para (Amazons), British Honduras, Costa Rica, Guatemala, and through Mexico. My figure is from a specimen in the B.M. Collection as named above.

Size, 14 × 4 mm., but the size is not constant.

1903a

POLYGLYPTA PALLIPES, Burm.

(Plate XXXVIII. fig. 6.)

Fairm. l.c. p. 298.

Uniformly dark brown or black, without any ornamentation by spots; pronotum greyish, with obscure carinations. Fairmaire counts nine of these ribs. Tegmina more ferruginous in tint; legs pale ochreous.

Fowler says the size of *P. pallipes* is very variable, and he considers the insect as the male of *P. dorsalis*, as above described. As it is at present considered in our National Collection to be specific, I figure a specimen, the sex of which I could not determine. This species has somewhat the appearance of a small black oat.

Habitat.—Mexico.

POLYGLYPTA COSTATA, Burm. Fairm.

(Plate XXXVIII. fig. 7.)

Polyglypta bogotensis, Fairm. *P. nigriventris*, Fairm. l.c. p. 297. *P. straminea*, Walk. l.c. p. 544. *P. pilosa*, Fairm. p. 296. *P. viridi maculata*, Fairm. l.c. 298. *P. interrupta*, Walk. p. 545. *P. strigata*, Walk. p. 136, Suppt. *P. reflexa*, Butl. t. 3, fig. 2. *P. godmani*, Dist. Ent. Mon. Mag. xvi. p. 11.

The above synonyms are marked in the B.C.A. as sexual forms of *P. costata*. Those named after *P. pilosa* inclusive, are considered as males of *P. costata*.

Linear, rather longer than *P. dorsalis;* colour bright ochreous, with one central and three to four parallel ribs or carinæ on each side; the hollows punctured with brown; the usual characteristic ocellated marks are feebly represented by brown dashes in the carinæ; tegmina almost entirely covered by the pronotum, the anterior or end of which is slightly recurved; legs slender, pale, and hirsute.

Size, 17 × 4 mm.

Habitat.—Oojaca, Mexico.

Polyglypta godmani is figured by W. L. Distant in the Ent. Mon. Mag. xvi. p. 11 (1879) with the habitat, Costa Rica. Trazu, 6000 to 7000 feet elevation.

O POLYGLYPTA TRICOLOR, Butler.

(Plate XXXVIII. figs. 8, 8a.)

Butl. Cist. Ent. ii. p. 209, t. 3, fig. 5. Fowl. l.c. p. 125.

Smaller than the preceding species; colour dark brown, with two yellow interrupted patches on each side of the pronotum; a central carina is flanked by another on each side, making three the most obvious; legs yellow; there is a yellow punctured patch at the corner of each eye, near the region of the shoulders.

Size, 10 × 3 mm.

Habitat.—Oaxaca, Peru, Amula in Guerrero.

B.M. Collection.

6POLYGLYPTA BOGOTENSIS, Fairm.

(Plate XXXVIII. fig. 9.)

Fairm. l.c. p. 297.

Broad between the shoulders; bright shining yellow, generally with one central and four lateral carinæ on each side; pronotum viewed from the back with an irregular annular mark near the tail end, and another on each side nearer to the shoulders; tegmina olive brown; legs rather stout and reddish.

My figure from the National Collection only partially agrees with Fairmaire's description. "Cornu antico leviter recurvo, signis fuscis lateralibus vix conspicuis," but the colours clearly vary in different specimens.

Fowler places *P. bogotensis* as a synonym of *P. costata*.

Size, 11 × 3 mm.

Habitat.—Colombia.

GENUS: ENTYLIA, Germar.

Fairm. l.c. p. 299 (1846). Fowler, l.c. p. 129. Walk. l.c. p. 547.

This genus and the following Publilia of Stål is in some confusion, partly caused by the great variability of the species, their tendency to run into one another, and to show overlapping characters. Again the pronotum, which is generally a distinctive character, may here be either convex or concave. The procephalic processes, so far as form is concerned, are unreliable.

Canon Fowler gives thirteen synomyms for *Entylia sinuata*, Germar. Walker names twelve species in his list, which Stål cuts down to five.

Dr. Butler in a revision has reinstated three of these but has added two others.

It is doubtful if Stål's genus Publilia, the next named, will stand. It was erected to take in *Entylia concisa*, as the type. Fowler examined a long series of *Entylia sinuata* and he referred most of these insects to Dr. Butler's species, *E. inæqualis*.

The insects are small, but they may be recognised generally by the deep notched character of the dorsal ridge of the pronotum "profondément echancré."

Fairmaire describes the tegmina as having three basal, and two small discoidal areas, with the third apical area furcate. He figures five species in outline. (Pl. V. fig. 28 to 32.)

ENTYLIA SINUATA, Germ. l.c. p. 248.

(Plate XXXIX. fi. 1.)

Fairm. l.c. p. 300. Fowl. l.c. p. 130. Tab. VIII. figs. 12, 12a, 12b (var. Mira). *E. carinata*, Glover, Hemipt. t. 1, fig. 26. *E. bactriana*, Germ. *E. concisa*, Walk. p. 547. *E. indecisa*, Walk. l.c. p. 549. *E. decisa*, Walk. l.c. p. 518. *E. reducta*, l.c. p. 549. *E. impedita*, Walk. l.c. p. 137, suppt. *E. inæqualis*, Butl. l.c. p. 211, t. 3, fig. 7. *E. mira*, Butl. p. 211, t. 3, fig. 8.

Procephalon erect, sharp, and thin as seen from the front, but broad and notched by the profile view; the dorsum is furnished with a squarish truncated hump; general colour warm ochreous-red, with a broad yellow transverse band or fascia on the posterior pronotum, with distinct carinations; legs stout and yellow; the underside fuscous. My figure may be considered as typical of the species, which nevertheless, as before noted, is very variable. It is drawn from a British Museum example.

Size, 5 × 4 mm.

Habitat.—New York and North America.

ENTYLIA CONCISA.

(Plate XXXIX. figs. 2, 2a.)

Walk. List of Homopt. Ins. ii. p. 547.

Fowler enters this insect as a synonym of *E. sinuata*, and it certainly has very much the facies of that insect.

One feature of the genus is the pale transverse band on the pronotum, which, however, is much more developed in some species than others. Walker's insect shows this band broken into white isolated patches. The colour is concolorous brown; the hind legs are almost spatulate and yellow; the tegmina are hyaline, with yellow neuration; the areas are peculiar, and rather complex in venation at the apices.

I think the insect is probably only a variety of *E. sinuata*, in which Fowler concurs.

Size, 5 × 3 mm.

Habitat.—New York, St. John's Bluff, Florida.

ENTYLIA ÆDIPUS, n.s.

(Plate XXXIX. figs. 3, 3a, 3b.)

E. mira (?), var. Fowl. l.c. Tab. VIII. fig. 12, p. 131.

Colour ochreous-yellow; procephalic horn flat and broad by the profile view, but taper and acute by the front aspect; the dorsum raised into a rounded protuberance which posteriorly slopes to the apex.

The procephalon has two distinct carinæ, and each side of the dorsum has four strong carinæ besides the curved ones above on the protuberance; all the sulci or furrows between these carinæ are thickly and deeply punctured.

The underside is dark fuscous; the legs stout with large tarsi; the tegmina and wings hyaline, the former with a broad fuscous costal border; the reticulation of the tegmina is rather complex, but either four or five apical areas may be counted at the tips.

I suggest the specific name from the character of the somewhat swollen legs and tarsi.

Size, 5 × 4 mm.

Habitat.—Chilpancingo, Guarino, 4000 feet elevation.

ENTYLIA CONCAVA, Germ.

(Plate XXXIX. figs. 4, 4a.)

E. concava, Fairm. l.c. p. 301. *Membracis concava*, Say. Walk. l.c. p. 547.

The procephalon is reduced to a rounded eminence, and the pronotal carinæ, six on each side, are prominent and cross the two dusky fascia; the general colour is pale fuscous, and mottled darker.

Size, 5 × 3 mm.

Habitat.—North America.

Fairmaire points out the aspect of this insect as different from other species of Entylia, yet that it has characters essentially the same. Perhaps it might better be ranged under the allied genus Publilia.

PUBLILIA GRISEA, n.s.

(Plate XXXIX. figs. 5, 5a.)

Pronotum almost uniformly convex and without protuberances; pale brown, without fascia, but densely reticulated with white carinæ more or less confluent; there are three narrow brown stripes across each side of the pronotum; legs yellow; tegmina hyaline.

Size, 5 × 3 mm.

Habitat.—New York.

Figured from the Wollaston Collection.

PUBLILIA VITTATA.

(Plate XXXIX, figs. 6, 6a.)

Larger; metopodium perpendicular; dorsal ridge with a rounded prominence, divided from the procephalon by a deep notch; procephalon erect and truncated; colour warm ochreous-brown, with a narrow transverse whitish fascia.

The carinations are marked as brown panelled streaks; surfaces punctured; thorax dark brown; legs yellow, stout, with the hind tibiæ serrated; abdomen yellow and ringed.

Size, 7 × 4 mm.

Habitat.—New York, America.

From the Wollaston Collection.

There are two small specimens in the British Museum Collection, fixed on the same pin, very like *Entylia concisa*, the chief differences of which consist, in only having pale ochreous broad bands on the pronotum instead of the white felt-like patches. They differ also in size, but the above variations may be only sexual. I do not suppose them to constitute new species.

Other species of Entylia and Publilia not hitherto mentioned are:

Entylia gemmata, Germ. = *E. corniculata*, Fairm. l.c. p. 300, Pl. V. fig. 31. *E. incisa*, Walk. l.c. p. 548. *E. gemmata*, Fowl. l.c. p. 131. Guatemala.

Publilia porrecta, Fowl. l.c. p. 131. Mexico.

E. bactriana, Fairm. l.c. Pl. V. fig. 32. North America.

E. reducta, Walk. l.c. p. 549. United States.

GENUS: METHEISA, Fowler.

The genus Metheisa has mixed characters and affinities with several genera, such as Entylia, Publilia, Hille, and Lucella.

Although the neuration of the wings is different, in the carination of the pronotum it resembles Polyglypta. The tegmina shows four apical and two discoidal areas. These last are described as mostly long in shape. The wings have four apical, but no discoidal areas.

Legs are slender and furnished with elongated tarsi. Examples differ much in size and colour, but they are generally small insects.

The material at my disposal was too small to allow me to draw the neuration of the hyaline tegmina. Species occur either with, or without the short procephalic horn, the presence of which does not appear to be connected with the sex of the insect, but at present it is not safe to generalise on this secondary character.

METHEISA LUCILLODES.

(Plate XXXIX. fig. 7.)

Fowl. l.c. Tab. VIII. figs. 13, 13a, p. 132.

Varies much in respect of colour from greenish-ochreous to fuscous or even blackish; pronotal horn short, obtuse, and not always developed; if present, it is always fuscous in colour, and shows a distinct carina; legs ochreous or indistinctly brown; the discoidal areas of the tegmina are usually nearly equal in size, but the extreme area is the smaller.

The puncturation of the pronotum as in my figure is drawn much coarser than is represented in Canon Fowler's figure, in fact it appears more as depressed blotches between the carinæ. This species is described in the *Biologia*, p. 132, as very like small specimens of Lucilla, which genus, I conclude, is there considered synonymous with Metheisa. It is there noted as having the dorsum slightly protuberant behind, and not in front of the shoulders.

Viewed from the back the insect recalls the allied genus Polyglypta.

Size, 6 × 3 mm.

Habitat.—Chiriqui, 4000 feet.

0 METHEISA (LUCILLA) CUCULLATA, n.s.

(Plate XXXIX. fig. 8.)

The conspicuous white spot on the pronotum, and the general contour of my figured example, seem to justify its position as a species, and I name it from its hooded appearance.

0 METHEISA SINUATA, n.s.

(Plate XL. figs. 1, 1a, 1b.)

Robust, obtuse, compressed; dorsal ridge of the pronotums viewed in profile slightly convex, then suddenly perpendicular to the face; lower and lateral part strongly sinuous; upper ridge of a bright ochreous yellow, with fine spots on the pronotum between the carinæ; several black streaks and dots run in rows from the cephalic part towards the metopodium, and there are fine black lines at the posterior part of the pronotum; tegmina dark brown and covered; legs strong and obscurely red; tarsi long; eyes prominent; frons flat.

Size, 8 × 5 mm.

Habitat.—Brazil.

From the Wollaston Collection.

GENUS: 0 OXYGONIA. Fairm.

Fairm. l.c. p. 301. Walk. l.c. p. 550. Stål, Öfv. Kongl. Vet. Akad. p. 237.

0 OXYGONIA ACCUMINATA, n.g.

(Plate XL. figs. 2, 2a.)

Rather slender, with a stout and pointed dorsal eminence; colour warm brown, with numerous more or less discontinuous yellow carinæ; the pronotal sub-margin of an obscure brick-red colour and slightly sinuous; posterior end acute; underside dark brown; abdomen with pale edges to the somites; legs stout, the hind tibiæ hirsute. This insect also recalls the sculpturing of Polyglypta, an allied genus.

Size, 8 × 5 mm.

Habitat.—Mozu.

Figured from a specimen kindly lent from Mr. Rippon's Collection. This insect hardly agrees with either Metheisa or Entylia.

O

GENUS: OXYGONIA.

Fairm. l.c. p. 301. Walk. l.c. p. 550. Fowl. p. 133. Enuya. Stål Ofv. Kongl. vet. Akad. Förh. 1869, p. 235.

Fowler thinks that Stål's above-named sub-division of the genus is unnecessary. Fairmaire names ten species, amongst which are O *Oxygonia rufipes*, p. 301. O *O. chrysura*, p. 302. O *O. conica*, p. 302, and O *O. pacifica*. Of these he gives certain outlines of the pronotum, but the genus requires a revision.

OXYGONIA ACCUMINATA, n.s.

(Plate XL. figs. 2, 2a.)

Colour ochreous-yellow. Pronotum rounded in front, and thus it rises above the shoulders into a sharp and thorn-like horn, similar to Umbonia. The posterior horn is nearly straight, and continued to a sharp apex which extends much beyond the tips of the tegmina. The whole surface is broken into parallel carinæ, the hollows between which are pitted with brown depressions. Abdomen dark fuscous, the edges of the somites are pale. Legs ochreous and rather long.

Size, 8 × 5 mm. Brazil (?) Mozu.

From Mr. Rippon's Collection.

As probable synonyms I subjoin:

O *Bilimekia styliformis*, Fowl. l.c. Tab. VIII. figs. 9–9a, p. 127.
O *Bilimekia minor*, Fowl. l.c. p. 128.

O

GENUS: ADIPPE. Stål.

Stål, l.c. Vet. Ak. Förh. 1867, p. 555. Fowler, l.c. p. 133.

A distinct genus, with the pronotal ridge evenly rounded. Many species are brightly coloured, banded with yellow or spotted with dark brown. It includes some species of Fairmaire's genus, Oxygonia.

ADIPPE ZEBRINA, Fairm.

(Plate XL. fig. 3.)

Oxygonia Zebrina, Fairm. l.c. p. 305. *O. figurata*, Walk. l.c. Suppt. p. 137. *Adippe zebrina*, Stål.

The form of the brown markings in this and some other species is not constant; but the colours are usually ochreous-yellow, more or less pale in tint, with the brown stains confluent. Specimens differ considerably in size also.

Size, 7 × 4 to 5 × 3 mm.

Habitat.—Mexico, Teapa in Tabasco, Guatemala, Venezuela.

ADIPPE CONCINUA, Fowler.

(Plate XL. fig. 4.)

This larger insect, figured from M. Sallé's Collection, has a row of dusky dots above the extreme lower margin of the pronotum, and the legs are brighter, but the difference appears to me to be insufficient to separate it from the preceding species, unless the insect described in the B.C.A. is diverse in other characteristics. It is there noted as "a very distinct species, and cannot be confused with any other that I have seen."—Fowler.

Size, 7 × 4 mm.

Habitat—Bugaba.

ADIPPE OCELLATA, n.s.

(Plate XL. figs. 5, 5a.)

This insect has much the facies of *Adippe histrio* of Stål and of Walker, but nevertheless I think it is not identical, for the head and the underside do not show the conspicuous red colours as drawn in the B.C.A., and the ocellated mark in my specimens is very distinct. The small papilla above the posterior end in my figure possibly may not occur in all specimens. These differences, coupled with the habitat Rio Dagua, so far removed from Bogota, also may be considered.

Size, 5 × 3 mm.

Habitat.—Rio Dagua, Columbia.

Rosenberg Collection.

ADIPPE TESTUDO, n.s.

(Plate XL. figs. 6, 6a.)

The variegated markings of this species fancifully suggest the rhombic and coloured plates seen in some small tortoises. This species may be described as black, with broad confluent yellow lines forming black punctured bands or patches over the head, the dorsum, the sides, and across the posterior end, which is rather blunt. The legs are black, but the hind tibiæ are ringed with yellow.

The form of pigment deposited in the coreaceous matter of elytra in Coleoptera and other families of insects, is with many thought to be distinctive, and if found to be fairly constant, it may be allowed therefore in the Membracidæ.

Size, 7 × 3 mm.

Habitat.—Bogota.

Rippon Collection.

O ADIPPE FASCIATA.

(Plate XL. figs. 7, 7a, 7b.)

Like a very small "bumble-bee." Pronotum yellow, with fine ochreous punctures. Dorsum smooth and unevenly convex, with three dark fuscous transverse bands, and a black rather blunt apex. Tegmina clear, hyaline, with a broad fuscous costal area, showing a clear square spot within it. The neuration fine, black, and simple, showing two large discoidal areas, and irregular apical areas. These areas are difficult to classify homologically. Some might call them discoidal basal areas. The limbus is broad and corrugated. Legs fuscous.

Size, 7 × 3 mm.

Habitat.—Rio Dagua, Columbia.

O ADIPPE PARDALINA, Fowler.

(Plate XL. fig. 8.)

Fowl. Tab. VIII. figs. 16, 16a, p. 134.

A distinct species, but variable in size and depth of colour. Yellowish red, with a ridge down the dorsum, and with a brown band above the head; a broader one occurs across the shoulders, followed by two others towards the apex. The marginal border also has spots. Surface finely punctured. Legs dark, with a tendency to show rings. Tegmina hyaline, with a dark fuscous interrupted costal band, and a fuscous spot before the tip.

Size, 6 × 3 mm.

Habitat.—Panama, Chiriqui, captured at 4000 feet elevation.

Expanse; 12 × 7.

Fowler Collection.

GENUS: O ARGANTE, Fairmaire.

O *Hemiptycha*, Burm. O *Thelia*, Amy. et Serv. Fairm. p. 305.

This genus is closely allied to Adippe, but the shoulders are more prominent and appear as obtuse points. The venation of the tegmina is somewhat varied from the genus O Adippe.

ARGANTE SEMIFASCIATA.

(Plate XL. fig. 9, ♂, and XLI. figs. 1, 1a, ♀.)

Thelia semifasciata, Walk. l.c. p. 561.

Dingy yellow, punctured with brown. Dorsal view shows the fore-part of the pronotum almost triangular, with a rhomboidal spot on the carina, and a much larger notched brown spot below it extending to the sinuous margin of the pronotum. The outline by the profile view is very convex and tapers to a sharp point. Tegmina hyaline; with an ochreous-brown tinge at the apices. Neuration marked and brown, with one small apical area at the tip, and also three others less remote. The discoidal areas two. Legs tawny; abdomen black.

Size, 7 × 3 mm.

Habitat.—St. John's Bluff, E. Florida.

B.M. Collection.

ARGANTE SEMIFASCIA.

(Plate XLI. fig. 1, the ♀.)

GENUS: ANTIANTHE, Fowl.

Janthe. Stål Öfv. Kongl. Vet. Ak. Förh. 1867, p. 554. Fowl. l.c. p. 137.

One characteristic of this genus is that the pronotum is laminated almost like the genus Membracis proper, and that the metopidium is carried perpendicularly to a considerable elevation, even slightly overhanging the head. The corium has two discoidal areas, and the hind tibiæ are furnished with spines. Species are difficult to determine with precision. The tibiæ are not spatulate.

ANTIANTHE EXPANSA.

(Plate XLI. figs. 3, 3a.)

Hemiptycha, Germ. *Thelia*, Fairm. l.c. p. 309. Pl. v. fig. 6. *Hemiptycha cucullata*, Burm. *Janthe expansa*, Stål, l.c. p. 554.

Pronotum elevated, compressed, of an obscure or greenish yellow; the dorsal ridge marked with conspicuous but small dots; suprahumerals sharp and long.

A common and widely spread species, occurring over all Central America. In some localities the examples are very small, but the size is not dependent on sex, for many small individuals prove to be females, which commonly are the larger forms of sex amongst the Membracidæ.

Size, 16 × 8 to 7 × 4 mm.

Habitat.—Mexico, Vera Cruz, Belize in Honduras, Costa Rica, Bogota, Columbia.

OANTIANTHE HUMILIS.

(Plate XLI. figs. 4, 4a, 4b.)

This insect is very similar to O*A. viridissima*, but it is much smaller. It occurs rather commonly at Temax in Yucatan, but it may prove to be only a variety of ✓ *A. viridissima.*

CANTIANTHE FOLIACEA, Stål.

(Plate XLI. figs. 5, 5a.)

C*Janthe foliacea*, Stål, l.c. p. 554. Fowl. l.c. p. 138.

A large brown species, with a rounded pronotum; the fore margin above the vertex is curiously excavated; some specimens have a large brown patch covering the fore portion; the surface is much sculptured and marked with punctuations.

Size, 10 × 8 mm.

Habitat.—Costa Rica, Guatemala, Vera Paz.

OANTIANTHE COMPRESSA, n.s.

(Plate XLI. figs. 6, 6a.)

Rather large, pale sordid ochreous, finely punctured with warm brown; dorsal ridge of the pronotum slightly convex, until it approaches the apex, where it is suddenly depressed; there is a dull white transverse spot across the sharp carina, and dark brown blotches and mottlings on the sides, which are compressed; tegmina smoky hyaline, with faint fuscous veinings; there are no suprahumeral horns.

Size, 11 × 7 mm.

Habitat.—New York.

Wollaston Collection.

OANTIANTHE VIRIDISSIMA, Walk.

(Plate XLI. fig. 7.)

O*Thelia viridissima*, Walk. l.c. Suppt. p. 138. O*T. reversa*, Walk. l.c. p. 72. Fowler, l.c. p. 138.

The pronotum is not so much elevated over the shoulders as in O*A. expansa.* In figure it more nearly approaches O*A. humilis.* The colour is variable, but in recent examples it is strongly greenish, and these often appear with a natural varnish; such a surface might serve as a protection against the almost tropical rains of the districts which the insects inhabit. The tegmina also are shining and irridescent.

Size, 8 × 6 mm.

Habitat.—Columbia, Mexico City.

Dr. F. W. Goding bases his classification of the sub-tribe (*sic*) Smiliinæ, principally in the neuration of the clavus. The examination of this somewhat intricate feature necessitates much material for dissection. Dr. Goding notes six genera, of which Cyrtolobus and Vanduzea are new to science.

Cyrtosia of Fitch has been pre-occupied by the Diptera, and therefore Dr. Goding proposes Cyrtolobus in substitution. See Trans. Americ. Entomol. Soc., 1892.

Smilia of Germar shows three nervures passing out of the corium, and continuous near the base, with one or two discoidal areas.

GENUS: CYRTOLOBUS, Godg.

Trans. Americ. Ent. Soc. vol. xix. p. 257. *Cyrtosia*, Fitch *Gargara*. Emmons, 1854, N. York. Fowl. l.c. p. 140.

Pronotum slightly compressed, and but little elevated; suprahumerals obtuse or none; front angles not produced; apical area stylate.

CYRTOLOBUS DISCOIDALIS, Fowl.

(Plate XLI. fig. 8.)

Fowl. l.c. p. 141. Tab. VIII. figs. 25, 25a, 25b.

Canon Fowler's figure is, as above, drawn from a specimen identical with that named by Dr. Goding, *Cyrtosia discoidalis* Emmons = *Atymna carinata*. Its general character is so similar to that I figure from our National Collection, that I must consider these insects are identical. The suprahumerals, however, are much suppressed. Mr. Kirby thinks that *Membracis Vau* of Say should be a synonym of *C. discoidalis*. Five other species of this genus are described in the Biologia Centrali Americana, viz.:

Cyrtolobus crucifer—*Cyrtosia crucifer*, Stål. Fowl. l.c. Tab. VIII. fig. 24, p. 140. Mexico.
C. virescens, Fowler, l.c. Tab. IX. fig. 1, p. 141. Mexico.
C. distinguendus, Fowl. p. 141.
C. vittalipennis, Fowler, p. 142. Mexico.
C. inæqualis, Fowl. l.c. Tab. IX. fig. 2, p. 142. Mexico.

GIBBOMORPHA PARVULA, n.g.

(Plate XLI. figs. 9 ♀, 9a–9c.)

Small; pronotum smooth, stout, gibbous, and uniformly convex; the hinder part prolonged into a sharp tapering point, which extends nearly to the tips of the tegmina, and is so far free from the abdomen as partially to show the rudimentary scutellum below; colour black and shining; legs dusky ferruginous, the hind pair hirsute; tegmina rounded with a broad limbus, and with five apical and three discoidal areas; clear hyaline with orange at the base, and slightly so at the apices; eyes very large, grey, and almost petiolate; frons convex.

Size, 4 × 2 mm.

Habitat.—Unknown.

Heine, collector.

○ GIBBOMORPHA AUREA, n.s.

(Plate XLII. figs. 1, 1a, 1b.)

Larger than the last species; pronotum shining black with a bluish glance or beam of light; lower marginal border strongly sinuate and showing the greyer scutellum below; tegmina bright orange at the bases; the limbus also is tinged with the same colour; the eyes prominently stand out from the head, and are almost sessile; neuration distinct and fuscous.

Size, 7 × 3 mm.

Habitat.—(?).

Heine.—Own Collection.

Possibly this may prove to be the male of the last insect. They were both collected at the same time. Though only two specimens could be examined, these seemed to justify the naming of a new genus.

○ HILLE MACULICORNIS, Stål.

(Plate XLII. fig. 2.)

Stål, Öfv. Kongl. Vet. Förh. 1867, p. 555.

The form of the pronotum and the porrect horn recall the genus Oxygonia, with which and the genus Polyglypta it has certain affinities.

By the kindness of Dr. C. Aurivilliurs I am able to figure the genus Hille from one of Stål's type specimens in the Stockholm Museum.

○ *Hille pacifica* = Oxyonia of Fairmaire I have not seen.

H. maculicornis is bright yellow, robust in form, with a strong upright red process scored with four brown lines on each of its sides. The surface is strongly sculptured with ridges, and brown longitudinal punctures. At the apex of the pronotum there is a black eye-like spot, with a white centre. The legs are yellow, and the tegmina are ferruginous red, and likewise stippled in rows.

Size, 9 × 6 mm.

Habitat.—Bogota.

The old genus Thelia of Germar, though adopted by Fairmaire and Walker, has now been distributed amongst newer genera. Fairmaire describes twenty-one species, showing very varied characters, and comprises Hemiptycha of Burmeister, and part of Smilia of Amyot and Serville. Fairmaire's outline figures show a great diversity of forms of the pronota. The neuration of the tegmina is obscurely indicated by the elytra, showing by description four basal and two discoidals separated by one basal cell.

I describe a large and handsome species, which has certain affinities with the foregoing genera Oxygonia and Polyglypta.

oTHELIA MULTIGLYPTA.

(Plate XLII. fig. 3 ♂, and fig. 4 ♀.)

✓*Thelia multiglypta*, Fairm. l.c. Pl. V. figs. 4 and 12, p. 366.

The pronotum keeled and boat-like ("naviformis"), with a head apparently capable of protrusion. The sides are deeply scored with many longitudinal furrows or striæ, which are also deeply punctured with brown or black points. These striations are more pronounced in the males. Fairmaire states the colours as varying from yellow to sanguinary, with red femora and black tibiæ. The colour of my specimens are not so brilliant, but I do not doubt their identity as given above.

Their occurrence at Canar, in Ecuador, may account for their different sizes in Bogota.

Expanse, 22 mm.

Size, from 12 × 4 to 14 × 6 mm.

Rosenberg Collection.

oPUBLILIA CONCAVA, Stål.

(Plate XLII. fig. 5.)

Entylia concava, Germ. *Membracis concava*, Say. in Long's second exped. ii. p. 301 (1824).

This genus was erected by Stål to receive the above species, the chief characteristic of which is a slight depression before the middle of the convex edge of the pronotum. Dr. Charles Aurivilliers enables me to figure one of Stål's type-specimens of Publilia.

Canon Fowler doubts the necessity of dividing the genus Entylia, but the neuration of the tegmina appears slightly to differ in the genera.

Size, 10 × 6 mm.

Habitat.—Wisconsin, America.

oATYMNA CASTANEÆ.

Stål. l.c. p. 554. Fowler, l.c. p. 140.

Very like Cyrtolobus of Goding.

Smilia castaneæ of Fitch appears to differ from *Atymna castaneæ* only in having a smoky band at the apex of the tegmina.

Habitat.—North America, New York.

ATYMNA LINEATA.

(Plate XLII. fig. 6.)

Dr. Aurivillius forwarded to me a type specimen of Atymna, but without any specific name attached. It differs from *A. castaneæ* in not showing the smoky band on the tegmina, and in having on the concolorus yellow pronotum a fine but marked black streak, proceeding from the metopidium along the dorsal ridge to the posterior apex. The tegmina are clear hyaline yellow, with a delicate neuration, showing four apical areas.

It is doubtful whether Atymna should be separated from Cyrtolobus. The insect above described may be compared with Plate XLI. fig. 8. If colour be neglected, there is much similarity of form to be noted between these species.

Expanse, 16 × 2 mm.

Habitat.—Belfrage, New Jersey, North America.

STICTOCEPHALA LUTEA, Stål.

(Plate XLII. fig. 7.)

Under the specific name *Stictocephala semibrunnea*, I have described an insect very like *S. lutea* as now figured from one of Stål's types. As there noted, the marked differences of the two genera Ceresa and Stictocephala lies in the short and squarish termination of the pygofer of the male of Stictocephala. I could not dissect the specimen from the Stockholm Museum, but the different form of the abdominal segment may be seen through the transparent tegmina.

Plate XXXVI. fig. 6 may be used for the purposes of comparison.

Size, 7 × 4 mm.

Habitat.—Belfrage, New Jersey.

STICTOCEPHALA NERVOSA, n.s.

(Plate XLII. fig. 8.)

With hesitation I figure an insect from the Wollaston Collection as pertaining, perhaps, to Stictocephala. The straight margin to the pronotum and the broad neuration of the tegmina, seems to indicate a specific difference.

The pronotum is coarsely punctured, and has a brown apex with a fuscous patch above the unarmed shoulders. Legs are yellow, with a fuscous streak on the fore femora.

Habitat.—New York.

The genus Ophiderma of Fairmaire is marked by a convex broad dorsum.

Ophiderma salamandra is described by Fairmaire, l.c. p, 493, as brown, and variegated with yellow lines.

Size, 7 mm.

Habitat.—New York.

Ophiderma mus appears to be a handsome and spotted species. I have not seen either of these two species. The last mentioned is figured in the B.C.A. and is there described. Tab. IX. fig. 3. p. 142.

Dr· F. W. Goding divides the Smiliinæ into four tribes, of which Telamonini is the last named.

It there includes six genera, which require a close study, before the numerous species contained in them can be located with certainty.

These genera are according to Goding:

1. *Thelia*, Am. et Serv.
2. *Telamona*, Fitch.
3. *Heliria*, Stål.
4. *Optilete*, Stål.
5. *Carynota*, Fitch.
6. *Archasia*, Stål.

The genera appear to be principally confined to North America, and are synoptically treated by Goding as part of the Homopterous insects of North America. Trans. Amer. Entom. Soc.. 1892, p. 258.

Our knowledge of the group is very scanty as yet. Under the restricted genus Telamona, only seven species are described in the Biologia Centrali Americana, but the diverse forms of the pronota of these will show how difficult is the task of classification simply from their facies, or general aspect. The material at my disposal is too small to allow of a criticism of the above arrangement.

GENUS: TELAMONA. Fitch.

Thelia, Amy. et Serv. p. 540. Fairm. l.c. p. 305. Fowler, l.c. p. 143.

The species of this group are somewhat numerous, and are as before noticed, remarkable for the diverse forms of their pronotum. Stål, on account of this characteristic, separated *T. cristata* from the rest, but some, like Canon Fowler, might think this to be unnecessary. Nevertheless, I have retained Stål's genus Heliria, as containing insects extreme in shape, and of more than the usual magnitude.

The neuration of the wings follows that of the Smiliinæ, but the allocation of the areas of the tegmina is not easily defined. The apical area is small and sessile, but often it is little seen. The tegmina have three marked parallel nervures.

TELAMONA BRUNEIPENNIS, n.s.

(Plate XLIII. figs. 1, 1a.)

Large; metopidium round, very convex. The pronotum rising at the dorsum, into a considerable hump or eminence, which afterwards falls into a straight ridge extending much beyond the abdomen, and nearly to the apex of the tegmina. These latter organs are fusco-hyaline, with brown tips, and with strong brown parallel venation. The colour dark ochraceous, finely blotched with warm fuscous; legs brown.

The ridge of the metopidium above the frons is furnished with fine black punctures.

Size, 12 × 7 mm.

Habitat.—New York.

Wollaston Collection.

This insect does not appear to be figured in the B.C.A., or described elsewhere.

TELAMONA GIBBA, n.s.

(Plate XLIII. figs. 2, 2a.)

Large; shining piceous or deep brown. The pronotum rising above the metopidium into a blunt and short horn, projecting forwards; behind this horn a smaller dorsal eminence which gradually slopes to a sharp thin apex, and reaches to the tips of the tegmina. Suprahumerals, as seen from the front, very obtuse. Tegmina dark, almost black. Legs stout, and of a warm sienna brown colour.

Size, 13 × 9 mm.

Habitat.—Bogota.

Kindly lent from Mr. Rippon's Collection.

TELAMONA DORSALIS, n.s.

(Plate XLIII. figs. 3, 3a, 3b.)

Pronotum rising like *T. bruneipennis* into a compressed rounded dorsal hump. General colour pale brown, with fine streaks and blotches; the back of the horn has a conspicuous broad whitish stripe extending to the apex of the pronotum; legs brown; dorsal aspect scutiform, with blunt suprahumerals; tegmina not longer than the pronotum.

Size, 9 × 6 mm.

Habitat.—North America (?).

Wollaston Collection.

O TELAMONA SINUATA, Fowl.

(Plate XLIII. fig. 5.)

Fowler, B.C.A. Tab. IX. figs. 7, 7a, p. 145 ♂.

Like O *T. cristata*, but larger, and having the dorsal protuberances succeeded by a smaller posterior swelling; the colour griseous, variegated with dark brown.

Fowler remarks that this species is allied to O *T. tristis* of Fitch, to O *T. salvini*, Distant, and to O *T. spreta*, Goding.

Size, 11 × 5 mm.

Habitat.—Mexico, Amula, from 6000 to 7000 feet.

Figure drawn by permission from the B.C.A.

O TELAMONA ALBIDORSATA.

(Plate XLIII. fig. 6.)

Fowler, l.c. Tab. IX. figs. 8, 8a, p. 145.

This insect I figure by permission from the B.C.A. The male insect has the colour fuscous, with the pronotum furnished with a white distinct band from the apex of the dorsal protuberance to the point of the posterior process; the sides irrorated with small white or greenish spots; tegmina fusco-hyaline, clearer on the external margin, and infuscate at the apex; legs partly testaceous.

Size, 9 × 5 mm.

Habitat.—Rinconada in Vera Cruz.

O TELAMONA TURRITELLA, n.s.

(Plate XLIII. fig. 6.)

Not unlike O *T. sinuata* in general form, but with the pronotum shining rich brown, with fine punctuation, which in a strong light shows a bluish glance; metopidium convex and shining ochreous; the dorsal protuberance somewhat turret-shaped, and cleft; tegmina ferruginous; brown at their bases, with the rest of the membrane clear hyaline; limbus broad; legs with ochreous tibia.

Size, 9 × 5 mm.

Habitat.—Sanguanay.

Figured from one of two specimens, liberally placed with some other species at my disposal by the Royal Museum of Belgium. The specimen has a cabinet label, *Thelia pusilla* (V. Huart).

O HELIRIA ANOFLAVA, n.s.

(Plate XLIII. figs. 4, 4a, 4b.)

As before said, this genus has a doubtful standing, but I describe an insect of a singular appearance which, though closely allied to Telamona, may yet prove to belong to Stål's genus Heliria as thus separated. It certainly is not, however, *Heliria cristata* as figured in the B.C.A.

Large, almost black by the naked eye, but shining brown in a strong light, furnished with a yellow triangular patch at the posterior end of the globuloid pronotum; the dorsum is inflated and tuberose, with the principal swelling above the blunt suprahumerals; the pronotum short, and showing the dark fumose tegmina free; legs pitchy black, with the hind pairs coarsely serrated; lower margin of the pronotum deeply sinuous at the wing insertions; frons pale, with the ocelli in deep pits; colour of the face sienna yellow; tegmina dark, and thus obscuring the neuration, which is peculiar; the apical area is not stylate. The figure is that of a male, with a protruding style to the abdomen.

Expanse, 12 × 9 mm.

Habitat.—North America (?).

T. V. Wollaston Coll.

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Genus: LYCODERES.

O*Stegaspis*, Germ. Burm. Fairmaire, l.c. p. 522. Fowler, l.c. p. 164.

The neuration of this genus is one of the chief characteristics by which it may be known. Except for this particular, the facies of the species is very varied.

The recorded species are rather numerous, but they seem to require a regrouping with some reference to the general aspects of the insects. Plate III. of Fairmaire's above-named "Revue de la Tribu" may be consulted, to show by the small outlined figures, the remarkable forms assumed by the prothorax. The procephalon may be porrect, twisted, or hammer-headed; the pronotum may be inflated or compressed like Membracis proper; the fore tibiæ may be spatulate or prismatic.

The tegmina are short, and show three basal and one discoidal area. The areas near the costa are semi-coreaceous, much punctured, and sometimes very obscurely seen.

Fairmaire describes seventeen species, and Fowler figures two more, both with porrect horns like 0*Aconophora*, and a venation somewhat similar to Bocydium.

The scutellum is barely visible, but Fairmaire says, "Prothorax très visiblement échancré sur l'écusson."

Stegaspis of Germar is allied to Lycoderes, but the apex of the pronotum is not lobed.

LYCODERES, Fairm. Fowler.

Stegaspis, Germ. Burm. Am. et Serv.

As Lycoderes of Fowler does not agree with Fairmaire's descriptions, I give the substance of the last author's diagnosis of the genus: head a little foliaceous, bilobed. Prothorax variable in form, dilated, impressed or even foliaceous, "échancré au dessus de l'écusson;" elytra large; nervures touching the posterior border; "trois cellules basilaires, une cellule discoidale, les posterieures oblique, jambes prismatiques, tibias comprimés," &c.

Stål subdivides Lycoderes on account of the forms of the pronota and the number of apical areas.

Brazil furnishes many species of this genus.

Lycoderes shows a tendency to bright colouring more than most genera of the family. Prof. Poulton thinks that any hereditary bias in this respect towards an ancestral colouring would be detrimental to the individual; as making the species difficult to adapt itself to a new environment. Yet this adaptive power may be strong in some species and absent in others, even under the same environment.

There are several secondary causes for the colours of insects: some are chemical, such as the transparent stains in chitine; some are due to deposited pigments, which can be acted on by light, of the character of chlorophyl and erythrophyl; others are due to the interference of light caused by the thin stratum of air imprisoned and refracted between two transparent films, as in the hues of some butterflies. But though the direct cause of the elaboration of the colour of plants and insects appears to be as yet beyond our ken, the fact that colours are fixed and located in definite patterns must call for attention in any classification of species.

O LYCODERES IGNIVENTER, n.s.

(Plate XLIV. figs. 2, 2a, 2b.)

Pronotum swelled above the metopidium into a small knob, from which rises a short straight process, cleft and twisted at the summit. From this same knob proceeds a nearly straight dorsal horn, acute at the end, with an angular swelling, which is free above the abdomen and allows a view of the small scutellum. Abdomen bright orange, with red edges to the somites; apex of the female genital apparatus, black; tegmina rounded at the tips, with the basal parts dense and punctured. A clear trapezoidal spot, tinged with red and with a brown bar, occurs on the posterior costal portion; legs rather slender and not flattened.

Size expanded, 15 × 8 mm.

Habitat.—Brazil.

From the Miers Collection.

O LYCODERES BURMEISTERI, Fairm.

(Plate XLIV. figs. 1, 1a, 1b.)

Fairm. l.c. Pl. III. fig. 28, p. 525. O *Enchenopa fissa*, Walk. l.c. p. 485. O *E. læta*, Walk. l.c. p. 494.

Piceous; pronotum seen from the back fusiform, pointed at both ends and rugose; the fore apex bilobed or twisted, the posterior end without the angular tooth seen in 0*L. igniventer;* tegmina dense brown, with a triangular membranous patch traversed with dark veins; abdomen red and pointed; no suprahumeral processes; tegmina with five apical areas terminated without a limbus; legs simple.

Dr. Goding gives the front tibiæ dilated, but my example from the B.M. Collection does not show such a modification.

Expanse, 15 × 8 mm.

Habitat.—Brazil, Rio de Janeiro.

This small but showy insect somewhat recalls a minute edition of a species of Gœana, a genus of the Cicadidæ without a horn or head appendage.

0 LYCODERES ANGUSTATA, n.s. ♂.

(Plate XLIV. figs. 3, 3a.)

Procephalon short and cleft at the apex; pronotum below, carried backwards as a long sinuous dilated blunt process, reaching nearly to the tail; abdomen in the males brown, ringed with orange; first and second legs dilated; tegmina ample, hyaline, each with broad angular brown clouding at the apical margin; venation brown and strongly marked. There is no limbus.

The pronotum is easily detached from the mesonotum. There is same variation in size and colour of the specimens in the Hope Museum.

Size, 9 × 5 mm.

Habitat.—Rio Janeiro (?).

Collected by Miers in South America.

0 LYCODERES FURCA, Westw.

(Plate XLIV. figs. 4, 4a, ♀.)

Westw. Fairm. l.c. p. 524.

Colour pale ochreous with bright yellow abdomen. Pronotum with an upright process rising above the head, which divides into two flat, foliated divergent plates. Hind part of pronotum arched, then dilated into a large knob, free from the body; scutellum uncovered; saw used in oviposition by the female is large and conspicuous; tegmina hyaline, with broad brown apical margins and a fine brown striga; brown also at the bases; fore legs rather flattened; hind legs long and stout.

The male is figured on Plate XLVII., fig. 4.

Expanse 12 mm.

Habitat.—(?)

Westwood. Hope Collection.

O LYCODERES FURCA, Westw. ♂.

(Plate XLVII. figs. 4, 4a, 4b.)

O *L. ancora*, Germ.? ♂.

This insect is more brightly coloured than the female which is drawn in Plate xliv., fig. 4.

The tegmina are strongly fuscous at their bases, leaving the disc of the wing uncoloured, convex and shining like talc; the apices are pale fuscous or dark ochreous, with a sinuous fine brown stripe as seen in the female; the abdomen is bright yellow, ringed and pointed, with a large genital plate or pygofer; the pronotum is curved, and much thickened below.

Expanse, 12 × 6 mm.

From the Hope Collection, but there labelled *L. ancora*, Germ.

O LYCODERES MITRATUS, Germ.

(Plate XLIV. figs. 5, 5a.)

Fairm. l.c. Pl. III. fig. 25, p. 523.

Large; rich brown, with a violet glance of light; abdomen rosy; pronotum elevated above the head, into a hammer-shaped protuberance, inflated and pointed at the apices; but produced backwards into a foliaceous flattened shell, free from the abdomen; tegmina partly hyaline, with five large apical areas; the apical border broadly warm fuscous; neuration black and limbus none. The pronotum shows obscure veining like that of a leaf, and in this respect it recalls the genus Œda; legs warm brown; the hind tibiæ spurred before the joints of the tarsi. (Guérin.)

Fairmaire points out that this insect formerly described as *L. spinolæ*, is the female of the above *L. mitratus*. My figure also is a female.

Size, 11 × 7 mm.

Habitat.—Brazil.

From the Hope Collection.

O LYCODERES TORTA, n.s.

(Plate XLIV. fig. 6.)

Colour pale brown, mottled with dark fuscous; apex of the procephalic cleft, with the horns very short and divergent. The posterior process cylindrical and sinuous, free above the abdomen, and without any dilation. The pronotum conceals the scutellum, but it is very short. Tegmina hyaline, short, and rounded; upper part semi-coriaceous and much punctured; legs dark brown, the front pair spatulate.

Size, 7 × 4 mm.

From the Hope Collection.

○LYCODERES CAPITATA.

(Plate XLIV. fig. 7, and Plate XIII. fig. 8.)

Small; colour ferruginous yellow; pronotum raised, flat by the profile view, then elevated, with a truncated apex by the front view, without being cleft; tegmina somewhat greyish, obscurely divided by nervures on a dense membrane, into five apical areas. Embolium of the tegmina denser than the rest and punctured. No limbal border.

The pronotum, unlike most of this genus, has no divided summit.

○ LYCODERES GAFFA, Fairm.

Fairm. l.c. Pl. III. fig. 29, p. 524.

Colour ferruginous brown or dark ochreous; pronotum with a short bilobed summit, which is produced backwards as a flat falciform or hooked process. This is dilated at the posterior apex, and curved over the tegmina without touching them. Tegmina ferruginous hyaline, darkest at their bases; fore-legs slightly spatulate. There are several specimens in the Hope Collection which differ in size and paleness of colour, and likeness in the curvature of the procephalon.

Size, 9 × 5 mm.

Habitat.—Brazil.

Miers Collection.

○LYCODERES TRUNCATULIS (n.s. ?).

(Plate XLV. fig. 1.)

This species is remarkable for the high and almost foliaceous, that is, compressed pronotum, which is not cleft. The species fall under the genus Stregaspis of Stål. The colour is uniformly warm ferruginous brown, with a paler yellow tinge in the fore portion, and this tone of colour is carried to the legs which are slightly spatulate. The texture of the tegmina is dense, with dark variegated markings, not easily defined.

Presented by Canon Fowler, from the Van Voixem Collection.

○LYCODERES SERRATICORNIS, Fowl.

(Plate XLV. fig. 2.)

Fowl. l.c. Tab. X. figs. 10, 10a, p. 165.

Rather large; pronotum produced into a long laminated horn, cleft at the summit, and obscurely serrated at the sides; broad between the shoulders; the posterior end much shorter than the tegmina; tegmina hairy, and coarsely veined with a pale and very narrow limbus; legs moderately long, the first and second tibiæ slightly spatulate, and rather spinose. The female has large caudal valves.

The whole insect is dull ochreous yellow a little greyer on the tegmina.

Size, 12 × 4 mm. to 9 × 4 mm.

Habitat.—Brazil, Panama. 6000 feet.

Rosenberg Collection.

The bodies of some specimens are sprinkled with a white secretion.

LYCODERES FUSCATA.

Colour of various shades of pale ochreous, and from warm brown to dark brown. Procephalic horn short curved and divergent at the summit, then sinuously projecting backwards as a posterior horn to a point, quite free from the dorsum, and reaching only to one half the length of the tegmina.

Tegmina semi-coreaceous obtusely rounded at the base. Sub-hyaline more or less clouded with brown. Five apical areas, with three discoidal and large basal cellules. The hinder part of pronotum partially covers the scutellum. First and second pairs of legs spatulose.

There are nine specimens in the Hope Museum.

Size, 7 × 4 mm.

Miers Collection.

LYCODERES ANCORA, Germ.

Centrotus ancora, Germ. Mag. d. Ent. IV. 322, pl. I. fig. 3.

Small; pronotum dark brown, with a short erect horn, having a flattish fuscated summit. The posterior part much curved and greatly dilated at the apex; abdomen acute, orange yellow showing the male styles largely developed; legs distinctly spatulate; the tegmina finely irridescent with a yellow band or fascia near the apical borders, edged with fuscous and the basal portion also is fuscous.

A single insect in the Hope Collection is doubly labelled, *L. ancora* and *L. fusca.* I consider this specimen to be the male of *L. furca.* It is more brightly coloured than my figure of the female drawn on Plate XLIV. fig. 4. Though so small it is a pretty insect with its delicate wings.

Expanse, 12 × 5 mm.

Habitat.—Rio Janeiro.

From the Miers Collection.

OTHER GENERA NOT HITHERTO RECORDED AS AMERICAN.

The history of our earth points to a time when the present division into the Old and the New Continents were united. Without touching on the hypothesis shadowed by the traditional Atlantis, and believed in by the ancient Egyptian priests to have existed in historic time, all competent geologists assert that previous to the immediate glacial period, the monkey and the palm-tree occurred within the limits of the Arctic Circle, and thus we might expect that the fauna and flora of temporal climes would be represented in the two continents.

When we pass away from Eocene times, we find that there are certain marked divisions of distribution over definite areas, and modern zoology indicates certain zones or districts, which will allow of a classified generalisation.

With reference to the genera of the Membracidæ it will be remembered, that up to the present time no corresponding traces of fossil insect life have been discovered, though singularly there is a fair abundance, in the rocks and sediments, of the casts or impressions of the kindred insect families of the Cercopidæ, Fulgoridæ, and Aphidiæ.

The genera previously described in this monograph belong almost exclusively to North and South America, and they are singularly distinctive in their forms. The genera which follow belong, though not exclusively, to the Old World; that is, to the continents of Europe, Asia, Africa, and Australia. They also are distinctive in form; yet not wholly so, for certain genera seem to overlap into America; although probably the species now known there are not identical.

Notwithstanding the fact that many Centrotidæ are found in North and South America it will be convenient to keep the subfamilies Membracidæ and Centrotidæ separate. Their genera, however, sometimes intermix or assimilate in certain characters. Such may be seen in the genera Bocydium, Lycoderes, Œda, and Hypsauchenia, the diagnosis of which follow below, and which may be thought to be introductory to the Centrotidæ proper.

GENUS: ŒDA.

Œda, Am. and Serv. Hemip. p. 546. *Membracis*, Fab. *Smilia*, Germ. *Smilia*, Westw. Ann. Nat. Hist. 1842. *Œda*, Fairm. l.c. p. 505.

This genus is remarkable from the large inflated pronotum which externally consists of a clear diaphanous horny membrane stretched over an elaborate net-work of veins. These nervures are disposed in the manner of a leaf in various stages of decay and colour, as yellow or reddish brown, and the pronotum has the appearance of a kind of balloon enclosing air only. The imitation of a leaf is very perfect, and sometimes even represents on the membrane the dark spots made by some insects on the surface, and so also the stalk from which the framework of the leaf-like neuration proceeds.

The body of the insect is quite hidden, but the object of concealment is, as in most of the Membracidæ, as yet unknown, though certainly it is in a manner protective. The legs are moderately large, and the tibiæ are non-spatulate. The tegmina are pale yellow, and follow the neuration of Bocydium, the genus subsequently described. The scutellum, of course, cannot be seen.

ŒDA INFLATA, Am. et Serv.

(Plate XLV. figs. 4, 4a.)

Fab. Ent. Syst. iv. 8. 1. Perty, Del. an. 178, pl. 35, fig. 8. Fairm. l.c. Pl. III. fig. 1, p. 506.

Pronotum large and projecting beyond the head, formed of two laminæ united to a narrow dorsal plate, which gives the structure a wedge-like form. The reddish or yellow membrane is finely reticulated, and gives the appearance of a faded autumnal leaf. There is a lateral row of brown spots, and the apex is acute and brown. The anterior apex is slightly cleft. The legs are pale fuscous and slightly hairy.

The inflated pronotum probably is connected with the respiratory apparatus of the insect, and it recalls the remarkable head of the great Surinam lantern fly, *Fulgora laternaria,* which structure probably is also connected with the insect's breathing organs.

Size, 16 × 9 mm.

Habitat.—Brazil.

There is a fine series in the Hope Collection. My figure is that of the male insect.

ŒDA FRONDOSA, n.s.

(Plate XLV. figs. 5, 5a.)

Pronotum inflated and marked much as in the last species, but the posterior and the anterior apices are rounded instead of acute, as in *Œda inflata.* The whole insect is of a pale yellowish tint (perhaps green in life), with brown longitudinal and transverse nervures. The row of brown spots is rather differently disposed, the tail end is not fuscous, and the insect is smaller than *Œda inflata.* It is possible that the example figured may prove to be *Œda inermis* of Fairmaire, p. 506. There is some difference in the colours of the species of this small but curious genus.

Size, 14 × 9 mm.

Habitat.—Brazil.

Wollaston Collection.

ŒDA INFORMIS, Westw.

(Plate XLV. figs. 3, 3a, 3b.)

Smilia, Westwood, Ann. of Nat. History, Pl. VI., April 1842. Fairm. l.c. p. 507, pt. vi. figs. 28, 28a, 28b, 28c.

Pronotum much inflated, irregular in outline, barely projecting over the head, and shorter than the tegmina. Membrane hyaline and cut into various sized areas, which are glistening. Two obscure fuscous bars run across the pronotum, unaccompanied by spots. The vertex is terminated by a short horn with a small protuberant knob, as may be noted in the horns of some Fulgoridæ. Tegmina pale yellowish, with a brown neuration; the abdomen fuscous.

The inflated pronotum is drawn in the figure of the natural size, and shows its outline not to be compressed or flat as in Membracis proper.

Size, 10 × 6 mm. ♂; 12 × 7 mm. ♀.

Habitat.—Brazil.

Wollaston and Hope Collections.

GENUS: BOCYDIUM.

Latr. Anim. Kingd. Am. et Serv. l.c. Fairmaire, l.c. p. 507. *Sphæronotus*, Lap. l.c. p.139. *Stylocentrus*, Fowler, l.c. p. 163.

The species of this genus are not numerous or often seen in cabinets. They are remarkable for the development of certain globular processes attached to the procephalon by a short branched style.

The general appearance of these insects is almost unique, and suggests almost a sport of imagination in development.*

The other general characters follow those of the genus Œda. Fairmaire describes five species, of which I figure four:

1. *Bocydium, globulare*, Germ.
2. *B. globuliferum*, Pellas.
3. *B. rufiglobum*, Fairm.
4. *B. tintinnabuliferum*, Less.
5. *B. germari*, Guer.
6. *B. ancora*, Perty.

Bocydium is not described by Dr. Goding in the Hemopterous insects of North America, nor in the Biologia of Central America. The examples known are found farther south, and belong apparently to Brazil. The genus Stylocentrus of Fowler is closely allied to Bocydium, and I figure the species as such, though assigned to a special genus in the B.C.A.

Stål does not include Bocydium in his "Homoptera Africana."

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* The heraldic scutcheon or the crest of the ancient family of Medici, was three balls, but how initiated is not known. This family originally were Lombards, and as such, were money-lenders, and might be classed now as pawnbrokers. Hence the mediæval arms have become the familiar three golden balls, so often seen over our pawnbrokers' shops. It may be fanciful, but if we were to adopt a trivial name for Bocydium, it might well be "The pawnbroker." Similarly the "chequers" which are painted on the doors of some houses of entertainment mark the excise and the office of the exchequer and was probably some form of abacus, an instrument for ready reckoning.

Mr. Mickeljohn informs me that in Brazil he often met with *B. globulare* in the country round Rio Janeiro. They inhabited the low bushes, and flitted from one shrub to another without difficulty or apparent laboured flight. An acrobat would be seriously overbalanced by similar five large balls attached to his head.

BOCYDIUM TINTINNABULIFERUM, Less.

(Plate XLV. fig. 6, ♂, 6a.)

Less. pl. 55, 1833. Fairm. l.c. p. 508.

Head and pronotum brown, not black; abdomen orange red; tubercles very hirsute, pale brown, the outer ones spinose; antennæ unusually conspicuous in the male insect, which also has a white band between the insertions of the tegmina. The tegmina are clear hyaline, with a strong brown neuration and a fuscous spot.

Fairmaire thinks possibly this insect is a variety of *B. globuliferum*.

Size, 6 × 4 mm.

Habitat.—Rio Janeiro.

From the Hope and the B.M. Collections.

BOCYDIUM RUFIGLOBUM.

(Plate XLV. fig. 7.)

Fairm. l.c. p. 508. Walk. l.c. p. 158.

Wholly rufous red except the tegmina, which are yellowish at the apex, with an obscure brown transverse fascia. The procephalic tubercles are densely hirsute with ferruginous felt-like pile; eyes prominent; legs and abdomen yellowish.

Although the above description only partially agrees with Fairmaire's diagnosis —for in my figure there are not four white bands on the pronotum, as he notices— I believe these insects are identical in species with his.

Size, 6 × 4 mm.

From the B.M. Collection.

BOCYDIUM GLOBULIFERUM, Germ.

(Plate XLV. fig. 8*a*.)

Fairm. l.c. p. 508.

Black, with four white anterior streaks and a white scutellum; breast, abdomen, and legs yellow; tegmina with brown fascia.

BOCYDIUM GLOBULARE, Germ. Stoll.

(Plate XLV. fig. 8, Plate XLVI. fig. 1.)

Sphæronotus globulare, Lap. Fairm. l.c. p. 508.

Colour wholly black, punctured, immaculate; tegmina fusco hyaline, with brown neuration; procephalon with five globular tubercles, each armed with a small spine; a long dorsal horn, but not reaching to the tips of the tegmina.

Not uncommon at Pernambucco, near Rio Janeiro.

Size, 7 mm.

Habitat.—Brazil.

BOCYDIUM ANCORA, Perty.

(Plate XLVI. figs. 2, 2a.)

Stylocentrus, Stål, Kongl. Sr. Vet. Ak. Handl. viii. 1, p. 49. Fairm. l.c. p. 509. Fowl. l.c. p. 163. *Stylocentrus championi*, Tab. X. fig. 8.

Bocydium was divided to receive *Bocydium ancora*, a rare species found in Cayenne, but it may be doubted as to the necessity of such a separation, and I restore it to the list given by Fairmaire, p. 509. I do not think that the insect I figure is separate from *Stylocentrus championi*.

A handsome insect, known by the upright procephalic style, branching horizontally on each side, and accompanied by a long sinuous horn, which starts from the middle and extends beyond the tegmina; there are no bulbous swellings; rich Vandyke brown in colour, with a white pilose streak across the metopidium, which unites above the scutellum; suprahumerals small and spinose; legs orange, with black tibial tips; tegmina variegated, with clear, angular costal spaces.

This insect, and the variety *S. championi*, is reputed to be scarce.

Size, 7 mm.

Habitat.—Brazil, Panama, Bugaba, 3000 feet. Cayenne.

Figured from the B.M. and the Wollaston Collection.

Canon Fowler includes this insect and also the genus Lycoderes in the sub-family Centrotinæ. Fairmaire adds *Bocydium germari*, of Brazil.

GENUS: HYPSAUCHENIA (Germ.).

This genus is placed after Centrotus by Fairmaire, p. 520, the character of which is controlled by the difficultly ascertained fact, whether the species have the scutellum covered or concealed by the pronotum. It is unsatisfactory that such an apparently important characteristic should be difficult to decide on. In Darnis the pronotum covers not only the scutellum but often even the whole tegmina. In Centrotus proper the scutellum, which all Membracidæ possess, is uncovered and easily seen. In numerous other genera the long dorsal process is too attenuated to conceal this part of the dorsum, and there are intermediate stages which leave us in uncertainty.

Fairmaire states for the genus Hypsauchenia, "Prothorax un peu moins long, que les elytres; très peu, mais visiblement échancrée sur l'écusson. Elytres libre légèrement échancrées." Nervures parallel with three basal (apical ?) and two discoidal areas. The sloping (?) of the pronotum and the tegmina is too indefinite to mark off a classificatory division, which some have grouped as a sub-family of Membracidæ.

Hypsauchenia and Lycoderes may almost be regarded as the connecting links between the species of the Old and New Worlds, through the genus Sphongophorus.

Hypsauchenia, like the last-named genus, has no suprahumeral processes, and the scutellum may be considered as concealed by the pronotum; the legs are not spatulate.

The species are fairly numerous, and are widely spread both in Asia, Africa, and the Philippine Islands.

b HYPSAUCHENIA HARDWICKII, Kirby.

(Plate XLVI. figs. 3, 3a, 3b.)

Kirby, Mag. Nat. Hist. 1829, p. 20, fig. 56. Fairm. l.c. Pl. III. fig. 21, Pl. VII. fig. 8, p. 520. 0 *H. ballista*, Germ.

Concolorous brown; procephalon furnished with a long curved and vertical horn, clavate and cleft at the summit into two leaves; inner edge serrated; pronotum free, and posteriorly produced into a rudder-like process extending towards, but much short of the tips of the tegmina; tegmina dark fuscous, with their apices long and pointed; neuration obscure; legs rather long and prismatic; proboscis long.

Size, 9 × 9 mm.

Drawn from one of several examples taken in September by Dr. J. G. Pilcher. Sikkim, Himalayas, 4000 feet.

All the above examples are larger than those recorded from Nepaul.

0 HYPSAUCHENIA FLORALIS, var?

Velvety brown, with yellow legs; the summit of the procephalic horn spreading into a floriated tuft like an architectural finial; the dorsal process expanded near the acute tip into a flat triangular blade.

Size, 8 × 8 mm.

Habitat.—Pegu.

O HYPSAUCHENIA BULBOSA, n.s.

(Plate XLVI. fig. 4.)

Dark ferruginous brown; the procephalon rising as a cone from above the shoulders into a twisted bulbous sculptured process, from which proceeds a long filament cleft at its extremity; the pronotum is carried backwards as a cylindrical attenuated process without any flattened blade; tegmina obscurely fuscated, bronzed in lustre, and with indistinct neuration; legs not spatulous.

Size, 10 × 3 mm.

Habitat.—Perak.

Mr. Distant's Collection, kindly lent by the owner, contains nine specimens.

O HYPSAUCHENIA SUBFUSCA, n.s.

(Plate XLVI. figs. 5, 5a.)

Colour ochreous yellow; tegmina mottled with brown, with a whitish fascia across the disc; the limbus broad, with the apical areas much subdivided; the summit of the procephalic horn is formed of two stylate lobes.

Size, 8 × 7 mm.

Habitat.—Assam.

From Mr. Distant's Collection.

O HYPSAUCHENIA WESTWOODII, Westw.

(Plate XLVI. figs. 6, 6a.)

Fairm. l.c. p. 521, Pl. VII. figs. 6, 7, and 8, p. 521.

Colour ferruginous brown; procephalon rising above the head into a compressed bi-carinated horn, which is ciliated posteriorly; the summit is bent at an angle, and divides into two branches, truncated at their apices; there is a pale patch on the dorsum. "L'échancrée sur l'écusson est à peine visible."—Fairmaire, l.c.

Size, 10 × 9 mm.

Habitat.—Philippine Isles.

O HYPSAUCHENIA PYGMÆA, n.s.

(Plate XLVII. fig. 1.)

This singularly shaped insect is remarkable from its long procephalic horn, which is cleft and foliated at the apex; the posterior part of the pronotum is flattened into a triangular process, and the abdomen is ochreous yellow and coloured like the eyes.

The specimen figured is that of a male from Mr. Distant's Collection.

Expanded 13 mm.

Size, 5 × 8 mm.

Habitat.—Assam, Darjeeling.

In some respects it resembles O *H. anodonta.* Tegmina brown, corrugated, and shining; wings with three radials; the foliated head is largest in the males.

C HYPSAUCHENIA ANODONTA, n.s.

(Plate XLVII. fig. 2.)

Sordid ochreous yellow, with a bronze-like glance; procephalic horn recurved, long, and with a foliated summit, doubly stylate. Character very like those of O *H. foliata,* but the insect is smaller, and it may be recognised by having no dorsal eminence on the long posterior process of the pronotum, and the dorsal edge being without serratures or small teeth; the foliated apex of the cephalic horn is similar in form, but larger; tegmina blackish, more or less stained with ferruginous brown.

The insect does not appear to be rare at Perak, at least Mr. Distant's Collection contains seven specimens, all similar. I could not certainly decide the sexes, but they all appeared to be males.

This genus may be separated at once from Spongophorus, by the fact that all the legs are non-spatulate.

Size, 8 × 8 mm.

Habitat.—Perak and Assam.

W. L. Distant Coll.

These last two species strongly recall the facies of O *Sphongophorus ballista,* but their differences are clearly shown by a microscope in their wings and legs.

O HYPSAUCHENIA ASPER, n.s.

(Plate XLVII. p. 3.)

This species is described from a broken specimen, but it shows well the neuration of the tegmina and the wings; the tegmina have clear and strongly punctured costæ, and furnished with five apical areas; the horn of the pronotum is broken at the summit of the specimen figured. The portion rising from the head is very rugose.

My figure shows clearly the spatulate legs and the long proboscis lying between them.

O LAMPROPTERA STYLATA, n.s.

(Plate XLVII. figs. 5, 5a, 5b.)

Fairm. l.c. Pl. III. fig. 11, p. 527.

Pronotum dark ochreous, pilose; the dorsal part rising into a dark fuscous upright hirsute style; the head furnished with two divergent short horns, brown; tegmina very shining and partly hyaline, with four (or five) apical areas; a brown fascia crosses near the apices; legs long and stout, with yellow tarsi; pronotum short.

Fairmaire states that the neuration is distinctly like that of a Lycoderes.

My unique example is from the Hope Collection. I am not certain, however, that it may not prove to be *Lycoderes capreolus*, Germ., but it does not answer to Fairmaire's description: "Nigra, dorso cornubus duobus erectis."

Size, 5 × 3 mm.

Habitat.—Amazons.

Bates.

LAMPROPTERA VACCA, Germ.

Fairm. l.c. p. 528, Pl. III. fig. 10.

I have not seen this insect, nor have I been able to draw *Lamproptera capreolus*, Germ. (*Centrotus*), l.c., Mag. Ent. p. 33, t. 1, fig. 4. There is one example of this last insect in the British Collection.

Habitat.—Brazil.

GENUS: MICREUNE. Walk.

Journ. Linn. Soc. p. 94.

The examples I figure are located here chiefly from the characters exhibited by Walker's type specimen *M. formidenda*. The variations, perhaps, are not greater than what we might expect from insects inhabiting such wide habitats as Africa and China. For the present these insects may be here grouped, rather than under the more general head Centrotinæ, which they mostly resemble.

MICREUNE FORMIDENDA, Walk.

(Plate XLVII. figs. 6, 6a.)

Walk. Journ. Linn Soc. 94, 49.

Black, punctured; the procephalon rising from the fore part of the pronotum into a short erect style, which branches into two long horns projecting backwards. The pronotum conical, and produced into a long almost straight process over the dorsum, but quite free and distinct from the same, and reaching nearly to the tips of the tegmina. The pronotum shows two white felt-like patches on each side, oblong in form. Tegmina black, with shining nervures and a broad costa; legs black and not spatulate.

Size, 12 × 8 mm.

Habitat.—Sarawak, Borneo.

In the B. M. Collection.

MICREUNE MACULARUM.

(Plate XLVII. figs. 7, 7a, 7b.)

Black; pronotum raised into a long trifid process above the head; the central horn curved backwards, much the longest, and continued over the dorsum at a considerable distance above it; the scutellum exposed; tegmina blackish with ochreous membranes with five apical areas and a broad limbus; abdomen black and ringed; legs rather long with the hind tibiæ obscurely serrated.

Size, 8 × 5 mm.

Habitat.—Perak, Borneo.

Mr. Rippon's Collection.

GENUS: KLEIDOS, n.g.

At present this is only known by the subjoined species, which seems, however, to be sufficiently diverse in form to allow of separation from other genera.

KLEIDOS VOMERIS, n.s.

(Plate XLVIII. figs. 2, 2a.)

Concolorous dusky brown; body black; pronotum with two strong, erect suprahumerals, clubbed, angular, and bifid at the tips. Between these a flat and curved horn, which is broad like a ploughshare and coarsely serrated at its lower edge, and extends to the tip of the abdomen; legs black; the tegmina are pale fuscous, with straight apical margins, and with broad limbi; neuration brown.

Size, 9 × 6 mm.

Habitat.—Ceylon.

Wollaston Collection.

GENUS: ANCHON, n.s.*

This genus may be chiefly distinguished by the almost rectangular attachment of the posterior horn of the pronotum, to the short upright process springing from the dorsum. This is carried horizontally and quite free from the scutellum. The suprahumerals are rather varied in form, some being clavate, and others being more arcuate in shape.

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* From *αγκων*, the elbow joint.

6ANCHON NODICORNIS.

(Plate XLVIII. figs. 1, 1a.)

O*Centrotus nodicornis*, Fairm. l.c. pl. 3, fig. 13, p. 511.

Pronotum shining greyish black, punctured, with two upright suprahumeral horns, recurved, and dilated at the tips, with three carinal edges, the hind edge running to a short thorn-like point, barely covering the scutellum. On the dorsum and between the suprahumerals, a blunt upright process rises with a tubercle, from which a long, sinuous, prismatic horn is continued, nearly to the tip of the tegmina.

A faint ochreous line runs down each of the suprahumerals; legs black, with fulvous tarsi; the tegmina fulvous, with dark yellow serration and a brownish stain at the apices.

This insect, when seen from the front, has the appearance of being antlered like a stag.

Size, 7 × 4 mm.

Habitat.—Natal, Cape of Good Hope.

B.M. Collection.

OANCHON RECTANGULATUM.

(Plate XLVIII. figs. 3, 3a.)

O*Centrotus granulatus*, Kirb. (?).

In some respects not unlike 6*M. nodicornis*, except that the dorsal horn is straight instead of sinuous, and the suprahumerals are less clavate at the tips. Tegmina hyaline, shining, with slight fuscous red at their bases; legs ferruginous. The front aspect shows the frons hirsute, and the shoulder processes to be slightly serrated.

Size, 5 × 3 mm.

Habitat.—Ceylon.

From Mr. Ernest Green's Collection.

OANCHON REMIGIUM, n.s.

(Plate XLVIII. figs. 5, 5a.)

Black; procephalic process branched into two rather slim arms, with expanded apices. Dorsum with a free rudder-like process, continued backward nearly to the tips of the tegmina. Tegmina ferruginous with ochreous red nervures. Legs black.

Dorsal aspect shows the long dorsal horn without its obtuse support, as can be seen in profile.

Size, 6 × 4 mm.

My figure is from a defective specimen in the Wollaston Collection. The neuration may be abnormal but is partly followed by the next species, which at present I also locate with the genus Anchon.

○ANCHON ALBOLINEATUM, n.s.

(Plate XLVIII. figs. 6, 6a, 6b.)

General colour warm ochreous yellow. Pronotum seen from the front aspect with sharp divergent horns, set at right angles—from a conical process carried to the tips of the tegmina, quite clear of the dorsum and sinuous in form. The metopidium and the base of this process fuscous, as also is the tip. The dorsal aspect shows the horns to be flat.

Legs ochreous. The scutellum exposed. Tegmina with a brown apical patch. The nervures reddish with discoidal areas somewhat like those of ○*Anchon remigium*. A white line occurs behind each shoulder.

Size, 7 × 4 mm.

Habitat.—Ograga, River Niger.

○ANCHON ULNIFORME.

(Plate XLIX. figs. 1, 1a.)

Colour concolorous brown. Pronotum, frons, and the legs thickly hirsute. Suprahumeral horns erect, rather divergent, truncated, and expanded at their tips. Posterior horn rising high and free from the abdomen, above the dorsum, with a process which is continued at a right angle, as a long, straight, rod-like horn. This reaches to the tips of the tegmina. Tegmina semihyaline and of a sordid brown colour, corrugated, with brown neurations and a marked limbal margin; apical areas five in number. Legs light brown.

Size, 7 × 5mm.

Habitat.—Tenasserim Valley, Myitta.

Mr. Distant's Coll., Doherty.

Eleven specimens of slightly different sizes.

○ANCHON DIRCE, n.s.

(Plate XLIX. fig. 2.)

○*Centrotus rectangulatus*, Kirb. (?)

Concolorous brown, with the abdomen ringed with yellow. The suprahumerals clubbed at their tips and curved backwards, posterior horn rectangular, free, and more than half the length of the abdomen. Tegmina hyaline with brown nervures, and with three brown stains in the costal, the apical, and the submarginal borders. Legs moderately long.

Expanse, 12mm.

Size, 6 × 4 mm.

Habitat.—Ceylon.

Hope Coll., Thwaites.

GENUS: ELAPHICEPS,* n.g.

The peculiar form of the bifid suprahumerals, the high metopidium, the dorsal attachment of the posterior process, and the different character of the neuration, seem to justify a generic separation from Anchon.

ELAPHICEPS CERVUS, n.s.

(Plate XLVIII. figs. 4, 4a.)

Colour, pale fuscous, except the procephalic process which is black and shining. This horn rises above the head, and spreads from the conical part into two branches each of which is bifid. At their origin a long cylindrical process points backwards, and is equal in length to the tegmina. These have dense membranes, marked by whitish veins.

The scutellum is partly exposed, and shows a white patch. The front aspect is branched, somewhat in the manner of a stag's head.

The suprahumerals are merely acute protuberances.

Size, 12 × 7 mm.

Habitat.—China.

NOTE.—The author has not proposed to himself the serious task of preparing a monograph of the Membracidæ of the world. He only hopes that some useful work may be accomplished as a pioneer, and some inducement offered to future competent entomologists to add to our scanty knowledge of an interesting family of insects.

This treatise does not even serve as a catalogue of all species. The time is not arrived for obtaining Central African, or the Asiatic species which doubtless exist.

Here again the author tenders his best thanks to Mr. W. F. Kirby for his help in comparing many insects with specimens contained in the cabinets of the British Museum. He also has liberally allowed him to use a preliminary catalogue, which he has prepared, of such Membracidæ as are therein contained, but he is in no ways committed to any classification adopted in this Monograph.

That portion which relates to the Smiliinæ the author proposes here to use. It deals with fifty-four genera, but perhaps, for present needs, it will be sufficient to name the genera and the authors who originally proposed them, and then to point out one or two characteristic species, which may be regarded as types of the genus. Such a plan, in addition to the coloured examples furnished by this work, may avail towards a rough classification and show the features of the group.

The author is painfully aware of many deficiencies, which have been partially met by a pretty constant appeal to the microscope.

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* From ελαφος, a deer or stag.

Abridged Catalogue of the Sub-family : *SMILIINÆ.*

1. SMILIA, Germ.

Smilia camelus, Fabr. *l.c.* p. 10. *Thelia camelus*, Fairm. *l.c.* p. 308, pt. 5, fig. 5. *Smilia centralis*, Germ. *l.c.* Silb. Rev. Ent. p. 235. *Smilia viridis var.* Goding, Butl. Illinois, Lab. III. p. 426.

Eight species. California.

2. ATYMNA, Stål.

**A. castaneæ*, Fitch, Fowl. *l.c.* p. 140.

Nine species. Mexico.

3. ARCHASIA, Stål.

A. conica, Walk. (*Thelia*) *l.c.* p. 557.

Five species. Florida.

4. CYPHOTES, Burm.

C. nodosus, Burm. *l.c.* p. 181, pl. 36, fig. 1–4.

One species. Para.

4A. MELIZODERES, Spin.

M. Gayi, Spin. *l.c.* p. 268, pl. 3, fig. 5 (1852).

Two species. Chili.

4B.—TELAMONA, Fitch.

Telamona monticola, Fitch, *l.c.* p. 7. *Thelia monticola*, Fairm. *l.c.* p. 309. *Thelia cyrtops*, Fairm. *l.c.* pl. 5, fig. 13. *Telamona querci*, Fitch, *l.c.* p. 51. United States.

Twenty-six species.

5. HERANICE, (?) Stål.

**H. multogypta*, Fairm. *l.c.* (*Thelia*) p. 306, plate 5, fig. 4.

One species. Colombia.

6. POLYRHYSSA, Stål.

P. cultrator, Stål. *l.c.* p. 26.

One species. S. America.

7. METHILLE, (?) Butl.

M. cuniata, Butl. *l.c.* (1881).

One species. Magellan.

8. HELIRIA, Stål.

H. scalaris, Fairm. (*Thelia*) *l.c.* 311, pl. 5, fig. 14.

Four species. N. America.

9. THELIA, Amy. and Serv.

**T. bimaculata*, Fairm. *l.c.* p. 312.

Ten species. N. America.

10. VANDUZEA, Goding.

**V. arcuata*, Say. *V. vestita*, Goding, *l.c.* p. 440.

Four species. N. America.

11. OPHIDERMA, Fairm.

O. mus., Fowl. *l.c.* 143, pl. 9, fig. 3. *O. salamandra*, Fairm. *l.c.* p. 493.

Six species. Guatemala, New York.

12. EVASHMEDEA, Goding.

E. concinna, Goding, *l.c.* p. 437. Orizona.

Three species.

Where the habitats are mentioned in this list it is only meant to imply that the genus is represented in that locality, but not necessarily that all the species are there to be found, or only there.

13. CARYNOTA, Fitch.

(*Optilete*) Stål. *l.c.* p. 556. *C. marmorata* (*Thelia*, Farm.) (*Gargara*, Emmons.).

Six species. Illinois, Canada.

14. CYSTOLOBUS, Fitch.

**C. Vau.*, Say. Fitch, *l.c.* p. 48 (*Thelia*, Walk.). *Cyrtosia fenestrata*, Fitch, *l.c.* p. 49.

Eighteen species. N. America.

15. OXYGONIA, Fairm.

O. rufipes, Fairm. *l.c.* pl. 5, fig. 10, p. 301. **O. erythropus*, Burm. (*Hemiptycha*), p. 139.

Ten species. Brazil.

16. STICTOCEPHALA, Stål.

**S. inermis*, Fab. (*Membracis*), *l.c.* 677. **S. lutea*, Walk. *l.c.* p. 550 (*Thelia*).

Fifteen species. Illinois.

17. HYPERMASTRIS, Fowl.

**H. brunnea*, Fowl. *l.c.* p. 94. *H. variegata*, Fowl. *l.c.*

Five species. Mexico.

18. HYGRIS, Stål.

H. unicarinata, *l.c.* p. 29.

One species. Rio Janeiro.

19. EROSNE, Stål.

**E. notata*, Walk. (*Thelia*) Ins. Saund. p. 72.

Three species. S. America.

20. APHETEA, Fowl.

A. inconspicua, Fowl. *l.c.* p. 95, pl. 6, fig. 25.

One species. Guatemala.

21. CLEPSYDRIUS, Fowl.

C. constrictus, Fowl. *l.c.* pl. 7, fig. 1.

One species. Mexico.

22. POLYGLYPTODES, Fowl.

P. scaphiformis, Fowl. *l.c.* pl. 8, fig. 11.

Three species. Guatemala.

23. METHEISA, Fowl.

M. lucillodes, Fowl. *l.c.* pl. 8, fig. 13.

One species. Panama.

24. CYPHONIA, Lap. *l.c.* p. 230, pt. 6, fig. 4.

**C. trifida*, Fabr, Lap. *l.c.* p. 230, pt. 6, fig. 4. (*Combophora*, Burm.)

Fifteen species. Brazil, Mexico.

25. MICRUTALIS, Fowler.

M. balteata, Fairm. (*Acutalis*), *l.c.* p. 496. *M. ballista*, Fowl. *l.c.* p. 110.

Nineteen species. Colombia.

26. ACUTALIS, Fairm.

**A. fusconervosa*, Fairm. *l.c.* p. 498; Fowl. *l.c.* p. 114.

Twenty-one species. Colombia.

27. POLYGLYPTA, Burm.

**P. costata*, Burm. *l.c.* p. 177; Fairm. *l.c.* p. 296. *P. dorsalis*, Fowl. *l.c.* p. 114, pl. 8, fig. 5.

Eight species. Amazons.

28. ADIPPE, Stål.

A. zebrina, Fairm. (*Oxygonia*) *l.c.* p. 305. *A. histrio*, Walk. (*Oxygonia*) Ins. Saund. p. 71.

Eleven species. Brazil.

29. ANTIANTHE, Fowl.

A. expansa, Germ. *l.c.* p. 245. *A. viridissima*, Walk. (*Thelia*) List. Suppt. p. 138.

Three species. Colombia, Mexico.

30. PUBLILIA, Stål.

P. concava, Say. (*Membracis*), *l.c.* p. 301. *P. porrecta*, Fowl. *l.c.* p. 181.

Five species. Mexico.

31. HYPSELOTROPIS, Stål.

H. obtusa, Stål, *l.c.* p. 27.

One species. S. America.

32. PHORMOPHORA, Stål.

P. maura, Fabr. *l.c.* p. 28.

One species. S. America.

33. ENNYA (OXYGONIA ?), Stål.

P. chrysura, Fairm. *l.c.* p. 302, pl. 5, fig. 18.

Four species. Panama.

34. POLYRHYSSA, Stål.

P. cultrata, Stål, *l.c.* (1869).

One species. S. America.

35. GODINGIA, Fowl.

G. guerreroensis, Fowl. *l.c.* p. 113, pl. 8, fig. 22.

One species. Mexico.

36. HILLE, Stål.

H. notata, Stål, *l.c.* p. 235.

Twelve species. Bogota.

37. ENTYLIA, Germ.

E. carinata = *Membracis sinuata*, Germ. *l.c.* p. 248. *E. turrita*, Butl. *l.c.* p. 212, pl. 3, fig. 9

Six species. Rio Janeiro.

38. LUCILLA, Stål.

L. intermedia, Fowl. Trans. Ent. Soc. Lond. p. 421 (1894).

Six species. Ecuador.

39. CERESA, Am. and Serv.

C. bubalus, Fab. *l.c.* p. 20, 18 (1803). *C. taurina*, Walk. *l.c.* Suppt. p. 131.

Forty-four species. Brazil.

40. EURITEA, Stål.

E. munda, Walk. *l.c.* Suppt. p. 152.

Two species. Guatemala.

41. TRACHYTALIS, Fowl.
T. isabellina, Fowl. *l.c.* pl. 7, fig. 25.

Two species.

42. BILIMEKIA, Fowl.
B. styliformis, Fowl. *l.c.* pl. 8, fig. 9.

Two species. Mexico.

43. MATURNA, Stål. (*Thelia*, Walk.)
M. ephippigera, Fairm. *l.c.* p. 311, pl. 5, fig. 11

One species.

44. ANTONÆ, Stål.
A. inflata, Stål, *l.c.* p. 243.

Eight species. Bogota.

45. MELUSINA, Stål. (?)
**M. nervosa*, Faim. (*ceresa*) *l.c.* p. 489. *M. exaltata*, Stål, *l.c.* p. 23.

Three species. Brazil, S. America.

46. POPPEA, Stål.
P. torva, Fowl. *l.c.* p. 98, pt. 7, fig. 4.

Nine species. Guatemala,

47 PARANTONAE, Fowl.
**P. dipteroides*, Fowl. *l.c.* pl. 7, fig. 10.

One species.

48. ILITHUCIA (?), Stål.
I. morio, Stål. *l.c.* p. 244 (1869), Fairm. (*Ceresa*).

One species, Bogota.

49. PARMULA, Fairm. Fairm. Stål.
**P. curvispina*, Walk. *l.c.* p. 152.

Nine species. Scutarem.

50. AMASTRIS, Stål.
A. obtigens, Fab. Stål. Fowler, *l.c.* p. 92, pl. 6, fig. 22 (*Thelia*, Walk.) (*Vanduzia*, Goding)

Six species. Rio Janeiro.

51. TYNELIA, Stål.
T. pubescens, Stål, *l.c*, p. 29.

America.

52. ERECHTIA, Walk.
**E. bicolor*, Walk. *l.c.* Suppt. 141 (1859).

One species. Santarem.

53. CENTROGONIA, Stål.
C. ciliata (*ceresa*, Fairm.) p. 287. *C. elegans*, Fowl. *l.c.* p. 107, pl. 7, fig 16.

New Granada, Panama.

54. PHACUSA, Stål.
P. fluvomarginata, Stål. Fowl. *l.c.* p. 111, pl. 7, fig. 19. *P. lineola*, *l.c.* p. 112, pl. 7, fig. 21.

Six species. Mexico.

N.B.—Genera and species which are represented in the British Museum are characterised by an asterisk.

Sub-family : D *CENTROTIDÆ.*

The modern writers on the Membracidæ are few in number, and of these we may mention the names of Fairmaire, Walker, Stål, Butler, Goding, and Fowler, all of whom have proposed systems of classification based chiefly on the pronotal or alary characters.

Here the onerous task of describing the Centrotidæ of the world is not attempted, indeed the time has not arrived for such. The object of this monograph has been chiefly to illustrate by figures such examples of genera and species as appear to be characteristic.

Such a treatment must necessarily leave many gaps in the series, partly caused by the difficulties to be faced in comparing the contents of distant museums, and the reluctance shown in some instances to lend specimens for illustration. The number of named species is large, but of these many are inadequately described.

The Centrotidæ may be generally recognised by having a distinct and more or less uncovered scutellum, and with the pronotum showing a long posterior horn or process which extends backwards.

Some genera are nevertheless destitute of this posterior horn, which makes their position in the family rather doubtful, and there are also uncertainties connected apparently with sex, as to the development of the suprahumeral processes.

The sub-family constitutes the larger part of the Membracidæ of the Old World continents, including Australia; but Canon Fowler has described forty species in the Biologia of Central America, and he separates them into twenty-four genera. Some of these are also represented by African and Asiatic species, but these are not identical with those of America.

Latterly doubt has been cast as to the propriety of separating the Centrotidæ from the rest of the Membracidæ. Such a division has a convenience even though it may not prove to be quite natural. In fact the groups run into one another, and there is no sharp separation. Thus the genera of the Old and the New Worlds overlap, as may be seen in Pterygia.

Although an attempt has been made to construct dichotomous tables of genera, it is well to look more to the diagnosis of species than to rely unduly on such tables, which are meant to be directive rather than final in their character.

It has been said that simplicity is one of the distinctive characters of verity, and doubtless the idea of oneness has its charm; but if we apply it to biology, the multiplicity of genera and species would seem to militate against this simplicity. Whether we look on the molecule as matter simply endowed with life, or as matter inanimate, the simple seems to vanish in the complex with its ramifications.

Yet the notion of classification—that is, of ranging things in order and sequence—involves the selection of like from the unlike, and therefore within intellectual limits we must bear with it. These remarks may be apologetic as to the proposal of the numerous new genera I here provisionally offer. Some of these genera probably will stand, as future research brings additional species into observation; whilst others may not stand this test. Classification must really be tentative; for nature refuses to be pressed into the moulds which we construct for her.

GENUS: OXYRHACHIS.

Burm. Amy. et Serv. Fairmaire, l.c. p. 267. Stål, l.c. p. 84. Walk. l.c. p. 503, 128.

Fairmaire gives the diagnosis of this genus as "Prothorax armé de deux cornes humérales se prolongeant au-delà de l'abdomen et quelquefois des élytres en lame aiguë. Tous les tibias dilatés." Scutellum hidden, and the head truncate. The genus Centruchoïdes of Fowler is very like Oxyrhachis, as is also Centruchus of Stål. The former genus is American, and the two latter are Old World forms, but it is probable that the slight differences in the neuration may be due to climatal and other like causes, for we can hardly expect that in so variable a family of insects all the world-wide forms should be strictly alike. The same remark may apply also to the spatuliform legs and the sometimes truncated suprahumeral processes instead of the usual acute characters.

In my figures of the species I propose to ignore these small differences in order to give a general view of this group. Subdivision may hereafter be more exactly done by other observers.

Stål describes the tegmina with five apical areas, and furnished with a broad limbus. All the tibiæ are stated to be dilated.

OXYRHACHIS TARANDUS.

(Plate XLIX. figs. 3, 3a, 3b.)

Centrotus tarandus, Amy. et Serv. l.c. 536. Fairm. l.c. 268, Pl. IV. fig. 13. Walk. supt. p. 503.

Fusco-ferruginous. Pronotum with two rather short porrect suprahumerals. The posterior process reaching to the tips of the tegmina, and the pronotum quite covering the scutellum. Tegmina hyaline, with fuscous nervures enclosing four apical areas and three discoidals. Legs stout and dark brown.

This species is widely spread over Asia and Africa.

Size, 8 × 5 mm.

Habitat.—Egypt, Abyssinia, Cape of Good Hope, India, Ceylon.

0 OXYRHACHIS CONCOLOR, n.s.

(Plate XLIX. figs. 4, 4a.)

Colour uniformly dark ferruginous. Pronotum as in the previous species with porrect suprahumerals. Surface rather greyish and pilose. Tibiæ of the first and second pair of legs flattened, but hardly spatulate. Tegmina dense, obscurely veined, and acute at the tips.

Habitat.—The Cape of Good Hope.

Mr. C. P. Lounsbury. 0

This does not agree with *O. furcicornis* from South Africa, as the horns are not truncated.

0 OXYRHACHIS NEGLECTUS.

(Plate XLIX. figs. 5, 5a.)

Colour pale ochreous, with a grey pubescence. Pronotum long, and with the suprahumerals rather obtuse from a profile view, but the suprahumerals porrect and divergent from the dorsal aspect. Posterior horn rapidly tapers to a point, and is rather shorter than the tegmina. Scutellum covered by the pronotum. Tegmina clear hyaline, with yellow neuration and a broad limbus. Legs yellowish and only feebly dilated.

Size, 7 × 3 mm.

Habitat.—South Australia.

0 OXYRHACHIS LIGNICOLA.

(Plate XLIX. figs. 6, 6a, 6b.)

Black. Pronotum with a straight dorsal ridge, tapering to a long acute point, rather recurved.

Suprahumeral horns moderately long, and projected in the same line with the dorsum. A white pilose patch on the scutellum, which, in some specimens, also covers the lower part of the frons, under the shoulders, and the upper part of the abdomen in the females. Tegmina longer than the pronotum, smoky hyaline with fine brown neuration. Legs of the female ochreous-yellow. The upper part of the frons is in the female brown and pilose. The male is somewhat smaller, and the pectus is clothed with white pilose matter. The legs are brown and tufted with the same colour, and also the edges of the abdominal rings.

Mr. Ernest Green, of the Royal Botanical Gardens, at Peradeniya, Ceylon, kindly forwarded me seven or eight specimens, captured at Raniseram in South India; and with them a fragment of the bark of a leguminous shrub, which was channeled and grooved by this species. About forty eggs had been disposed in double rows, but most of the eggs had lost their tops, caused by the fracture and escape of the larvæ.

Unfortunately the early forms of these larvæ were not found. The perfect eggs are white, very shining, and glittering like small pearls. I figure a portion of this channeled bark, with some of these eggs, and the remains of empty shells still fixed in the crevices.

Size, 7 × 4 mm.

Habitat.—Raniseram, S. India.

OXYRHACHIS TANGANENSIS.

(Plate XLIX. fig. 7.)

This species is somewhat divergent from the form of Oxyrhachis, inasmuch as the pronotal horn is sinuous rather than straight, and it is free above the abdomen. The tegmina have the neuration of Oxyrhachis, and are smoky hyaline with brown veining. Body black with a pale pubescence. Metopidium high, with the suprahumerals pointed by the front but slightly truncated by the side view. Legs black and not dilated, in which respect also it rather diverges from Oxyrhachis. Frons hirsute.

Size, 8 × 4 mm.

Habitat.—Tanga, South Africa.

GENUS: DAUNUS.

Stål, Hemip. Afric. iv. p. 87. Œfv. Vet. Akad. Förh. pp. 282–284 (1869).

Stål gives an insufficient diagnosis of his genus, which appears to show several affinities to Oxyrhachis, and to his genus Centruchus.

In his synopsis he says: "Cornubus lateralibus thoracis basi triquetris, sursum ab anticæ et postico sensim compressis apici latis et truncatis; lateribus scutelli distinguendis."

Mr. Kirby is inclined to place certain species, now in the British Museum, under the genus Daunus as above, and accordingly I range the following under this head, rather than propose a new genus, though they only partially agree with the diagnosis.

Mr. Kirby gives a list of nine described species, all catalogued as Centrotus.

DAUNUS DECISUS, Walk.

(Plate L. figs. 1, 1a, 1b, ♂ and ♀).

Walk. l.c. p. 621. *Centrotus vitta*, Walk. *C. truncaticornis*, Walk. *C. contorta*, Walk.

Dark fuscous, punctured with blunt somewhat divergent suprahumerals, carinated and prismatic. Tegmina ochreous hyaline, acute at the tips with a broad limbus. Neuration strong and brown. Posterior horn long, rather obtuse, and as long as the tegmina. Legs black, dilated, and obscurely spatulate.

Size, 8 × 5 mm.

Habitat.—Delagoa Bay, East Africa. Australia.

Jansen Collection.

ODAUNUS DECISUS, ♀.

(Plate L. figs. 1–1b.)

The female is larger than the male, and has more rounded suprahumerals, and the carinæ give them a more truncated and prismatic character. The legs are more spatulate, and the tegmina are redder in the neuration.

Size, 11 × 5 mm.

Habitat.—Delagoa Bay, E. Africa.

ODAUNUS GRANULATUS, Kirb.?

(Plate L. figs. 2, 2a.)

Kirb. (*Centrotus*) Jour. Linn. Soc. Lond. 24, p. 166 (1891).

Colour concolorous brown, with darker punctures, rather densely clothed with pale hairs. Suprahumerals truncated at their apices, carinated and divergent. Frons curved between the eyes. Posterior horn long and a little raised above the scutellum, and as long as the tegmina. Tegmina dark fuscous, with a blackish neuration forming corrugated membranous areas. Eyes large, and the antennæ visible.

Size, 10 × 7 mm.

Specimens kindly furnished by Mr. Green, of the Botanical Gardens of Ceylon.

ODAUNUS SUCCISUS.

(Plate L. figs. 3, 3a.)

Uniformly ferruginous yellow, with short divergent suprahumerals obtusely truncated at their tips, with sharp carination towards the frons. The pronotum tapers rapidly towards the posterior end, which is acute and as long as the abdomen. The tegmina are rather dense in the membrane with red veining; the apices pointed. The wings are delicate and hyaline. The abdomen of the female is ringed.

Size, 7 × 4 mm.

Habitat.—Adelaide, Australia.

ODAUNUS NODOSUS, n.s.

(Plate L. figs. 4, 4a, 4b.)

The male insect is sordid ochreous, with blunt and stout approximate suprahumeral horns. The posterior horn is short and hardly attains to half the length of the abdomen. A white tomentose spot occurs between the insertions of the wings. The tegmina are short and pointed, with a neuration like Oxyrhachis. The hind tibiæ are dilated.

Size, 7 × 3 mm.

Habitat.—Grahamstown, E. Africa.

Kindly presented by Mr. Charles Lounsbury.

DAUNUS PALLIDUS.

(Plate L. fig. 5.)

General colour greyish-brown. Suprahumerals porrect and rounded at the tips. Posterior horn as long as the tegmina and recurved at the extremity. Abdomen robust and ringed with grey. Tegmina short and densely ferruginous, with brown neuration. Wings hyaline. The tibiæ slightly spatulate.

Size, 7 × 4 mm.

GENUS: CENTRUCHOIDES, Fowl.

One chief difference between this and the genus Centruchus, Stål, consists in the wings having an additional discoidal area. There also is a divergence in the form of the suprahumerals.

CENTRUCHOIDES LATICORNIS.

(Plate L. figs. 7, 7a.)

Fowl. l.c. p. 162, Tab. X. fig. 6.

Ochreous-yellow. Suprahumerals short and truncated at their tips. Eyes prominent. Posterior process slender, and reaches to the apex of the tegmina.

A waxy secretion occurs on lower part of the abdomen, and this is also abundant below the frons of the insect. Legs dilated. This is an American species, whereas both Oxyrhachis and Centruchus are Old World forms.

Size, 9 × 4 mm.

Habitat.—Chiriqui.

Drawn from an example in the Fowler Collection.

CENTRUCHOIDES TASMANIÆ

(Plate L. fig. 6.)

Centrotus Tasmaniæ B.M.

Not unlike C. *laticornis*, but not so pilose; colour rufous brown.

Size, 9 × 6 mm.

Habitat.—Melbourne.

Genus : SEXTIUS.

Stål, Hem. Afri. iv. p. 88.

The form variable, but never with the horns compressed, either from behind or before. Thorax furnished with a longitudinal carina. Lateral horn three-cornered. The posterior horn tectiform, and hollow below. The scutellum not, or only slightly, prominulous. Apical areas of the tegmina divided by several anastomosing short veins (Stål).

SEXTIUS CUPREUS.

(Plate L. figs. 8, 8a.)

Centrotus cupreus, Kirb. Jour. Lin. Soc. p. 168 (1891).

Small, with a copper-like lustre in an oblique light, but dull greyish in other lights. Pronotum with two sharp but short suprahumerals clothed with fine hair, and with a long posterior horn. The thorax and the lower part of the frons and under the wing-insertions white. Tegmina dense and greyish-ferruginous. Neuration somewhat abnormal, as there appears to be only one discoidal area, and the apicals are long and curved. Legs moderate in length.

Size, 5 × 3 mm.

Habitat.—Ceylon.

From Mr. E. Green's Collection.

SEXTIUS VIRESCENS, Fairm.

(Plate LI. fig. 3.)

Fairm. *Centrotus virescens*, l.c. p. 515.

Small, rather obtuse. Pronotum with conical, but not very obvious suprahumeral processes. Metopidium square, with the frons broad between the eyes. Pronotum narrows rapidly from the dorsum to the posterior apex. Whole body fulvous yellow, except the abdomen, which is sordid green, punctured with fine dots. Legs reddish, with flattened tibiæ. Tegmina hyaline, rather short, with yellow neuration, and with reticulated apical cellules. The scutellum is partly hidden. As the specific name indicates, the insects are green whilst living.

Size, 7 × 3 mm.

Habitat.—Melbourne, Adelaide, Australia, Tasmania.

B.M. Collection.

Genus : CERAON, n.g.

The characteristics of this genus, and by which it may be distinguished from Daunus, are the truncated and broadly flattened extremities of the suprahumeral processes. These are carinated. The posterior horn is long, acute, somewhat curved, and free above the abdomen. The tegmina show a tendency to develop short transverse veins from the radials.

CERAON TUMESCENS.

(Plate LI. figs. 1, 1a.)

Colour dull ferruginous yellow or reddish testaceous. Pronotum darker. Suprahumerals broadly clavate by the front but blunt by the dorsal aspect. Posterior horn nearly straight and smooth. Tegmina dense, and not easily showing the venation, except by a mounting in Canada balsam. They then show the subdivision of the apical areas, by transverse veins. This is rather a large species with stout legs.

Size, 11 × 6 mm.

Habitat.—Tasmania.

Heine Coll.

CERAON CONTORTUM.

(Plate LI. fig. 2.)

Oxyrhachis contorta.

Smaller than the last. Pronotum broad above the insertions of the tegmina, then sloping over the scutellum. The posterior horn rises from the dorsum, and is carried to the tips of the tegmina. Abdomen tumid, ochreous in colour, and ringed. Tegmina veined as in the former species.

Size, 7 × 4. mm.

Habitat.—Tasmania (?).

From the B.M. Collection.

Australian forms of Centrotidæ may be expected to show certain differences from the Asiatic and African species. Though these differences are not greatly marked, they may be sufficient to allow of separation, and I group those below under a new genus, partly because their neuration is unlike that of the normal Centrotus, although some of the species have been usually placed as such.

GENUS : PTEROSTICTA, n.g.

Pronotum with short divergent suprahumerals, slightly truncated when seen from the sides, but acute from the front aspect. Dorsal region smooth, arcuate, not sinuous at the margins, and ending in a tapering posterior process, as long as the tips of the tegmina. Tibiæ rather stout, but not spatulate. Frons as in Centrotus, with a high metopidium. Tegmina hyaline, often pointed, with five unequal apical areas and two discoidals, but the neuration at the apices is cut and subdivided into small areas by numerous short transverse veins, so as to give a reticulated surface. The base of the costa and that of the clavus is densely spotted with semi-transparent pores like perforations. The clavus has two curved nervures.

Species at present are confined to Australia.

Pterosticta rubrilinea. P. spreta. P. rubridorsata. P. xantha.

OPTEROSTICTA RUBRILINEA.

(Plate LI. figs. 4, 4a.)

D

Very like *Sextius virescens*, but the suprahumeral processes are much more obtuse. They are porrect as in Oxyrhachis, and dark at their tips.

The posterior process has a bright red streak continued over the dorsum. The tegmina have the nervures subdivided at their apices, and the bases are transparently stippled. Probably the live insects are green in colour, instead of bright ochreous, as found in cabinets.

Size, 7 × 3 mm.

Habitat.—Adelaide.

Mr. J. O. Tepper's Collection.

OPTEROSTICTA SPRETA.

(Plate LI. figs. 5, 5a.)

Colour variable from bright yellow to sordid greenish. Pronotum with two short blunt suprahumerals, each having a rich brown stripe from its summit. Dorsal ridge nearly straight, pointed, and continued to the tips of the tegmina. Frons oval and rich brown, with conspicuous ocelli. Metopidium seen from the front square, with a broad brown band connecting the tips of the short horns. Legs short, flattened, and reddish-brown. Eyes placed in circular depressions. Tegmina elliptical and pointed. Neuration rather indistinct, but complex and reticulated.

Size, 7 × 3 mm.

Habitat.—Adelaide, Australia.

Mr. J. O. Tepper's Collection.

OPTEROSTICTA RUBRIDORSATA.

(Plate LI. figs. 6, 6a.)

Suprahumeral processes obtusely pointed and dark fuscous in colour; the posterior apex sordid ochreous-red and stouter than the last species described. The tegmina pointed at the apices, hyaline, and marked by reddish nervures, the radials at their tips being subdivided by short transverse nervures; the base much stippled with transparent pores. Legs dilated and ferruginous. The front aspect shows the horns slightly recurved. The example figured is a female, and has a red line down the dorsum.

Size, 8 × 5 mm.

Habitat.—S. Australia, Adelaide.

PTEROSTICTA XANTHA.

(Plate LI. figs. 7, 7a, 7b.)

Uniformly reddish-yellow, finely punctured. Pronotum with two subacute short suprahumeral processes, which are only slightly visible by the front aspect. The dorsum convex and smooth to the posterior end, which is sharp, and extends to the apices of the tegmina. Tegmina hyaline, with six apical and three subapical cells. Legs rather stout, with longish tarsi. Colour rusty-red as regards the femora. The specimen, drawn from the Adelaide Museum, shows the long setæ from the rostrum.

Size, 8 × 4 mm.

Labelled: November. Adelaide, Bursaria.

The ♀ is rather larger than the ♂, and is ferruginous-yellow with dark tips to the suprahumerals and apex of the pronotum.

Frons fuscous. The minute antennæ are placed below the ocelli. The scutellum is only in part uncovered.

PTEROSTICTA INTERPOSITA, n.s.

(Plate LII. figs. 1, 1a, ♂ and ♀.

The male is smaller than the female, and the suprahumerals are obtuse and not easily seen from the front. The metopidium is perpendicular, and is continued in a slight curve over the dorsum as a posterior horn, reaching to the tegmina. General colour dark fuscous, with a pale ochreous spot above the wing-insertions. The tegmina hyaline with a brown neuration. Legs brown and moderately long.

Size, 4 × 3 mm.

Habitat.—Adelaide.

The female has the suprahumerals more porrect and acute at the tips. The legs are only slightly dilated. The surface is roughly punctured.

Size, 6 × 3 mm. ♀, 4 × 2 mm. ♂.

Habitat.—Adelaide.

Mr. J. O. Tepper's Collection.

MEGALOSCHEMA LATICORNIS, n.g.

(Plate LII. fig. 2.)

Rather large. Genus remarkable for the great width between the eyes and the breadth between the suprahumerals. These last are divergent, squarely truncate at the tips, prismatic, and carinated. The posterior horn tapers evenly from the shoulders to the tip of the abdomen. Pronotum fine ochreous-yellow and much punctured. Abdomen ringed with brown. Legs small. The tegmina hyaline and delicately corrugated, with a strong ochreous neuration.

Expanse, 14 mm. Size, 8 × 4 mm.

Habitat.—Sumatra.

Jansen Collection.

GENUS : OTINOTUS, n.g.*

Suprahumeral processes short, acute, and curved backwards by the side aspect, connate and divergent by the front view. Tegmina with a more or less broad limbus. Legs short.

OTINOTUS BELUS, n.s.

(Plate LII. figs. 3, 3a.)

Black, rugose. Suprahumerals recurved, diverging horizontally by the front view. Frons pilose, eyes large. Posterior horn rather sinuous. Tegmina dingy ochreous, with a pale spot above the costa. Neuration black, limbus distinct. Legs stout, with ochreous tibiæ.

Size, 5 × 3 mm.

Habitat.—Unknown.

Heine Collection.

OTINOTUS PALLIPES.

(Plate LII. figs. 4, 4a.)

Large, black, punctured. Suprahumerals placed above a high metopidium. Dorsum sinuous and continued as a stout horn to the tips of the tegmina. A white crescentic spot behind each of the suprahumerals. Tegmina ochreous, with a brown limbal border. Neuration fulvous and distinct. Legs ochreous. Frons pilose. Metopidium coarsely punctured.

Size, 9 × 5 mm.

Habitat.—New Guinea.

B.M. Collection. (?)

OTINOTUS EXIGUA.

(Plate LII. figs. 5, 5a.)

Small, sordid fulvous, shading into dark grey. Pronotum with two stout blunt suprahumerals, rounded rather than acute. Tegmina obscurely hyaline, with coarse neuration. Legs strong, with flattened and ciliated yellow tibiæ. The underside is greyish. The posterior horn long.

Size, 5 × 4 mm.

Habitat.—Natal.

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* From ωτις, a horned bird, a bustard.

Numerous examples of the pupæ were kindly forwarded to me by Mr. Lounsbury, impaled on the same pins as were the imagoes. The suprahumeral processes are here represented by a single pointed dorsal horn, like an Umbonia. The abdomen has a series of teeth on the edges of the connexivum which mark the sutures of the body-rings. A blunt tail ends the apex of the abdomen. The sheaths of the tegmina are united to those of the wings, and the tibiæ are much like those shown by the perfect insect.

Under the microscope the tarsi seem to be obscurely trimerous. The head shows small but distinct antennæ below the eyes.

Size, 4 × 3 mm.

Natal.

OTINOTUS AMMON.

(Plate LII. figs. 6, 6a.)

Olivaceous green on the pronotum. Suprahumerals short and only slightly recurved. A white spot on each side of the dorsum behind the shoulders. Tegmina greyish-olive, with pale fuscous nervures. Legs fuscous. There is a tendency to show an ochreous spot below the wing-insertions. The metopidium is shorter than in *O. pallipes*, and the horns are less developed.

Size, 8 × 4 mm.

Habitat.—Nilghery Hills, India.

Hope Collection.

OTINOTUS PACTOLUS.

(Plate LII. figs. 7, 7a.)

Shining blue-black, much punctured. Suprahumerals short and recurved. The posterior horn free above the abdomen. Stout at the base, and with a slight tooth above. Tegmina shining bluish-brown at their bases, but sienna-brown at their apices. Legs fuscous. Metopidium tomentose and corrugated.

Size, 9 × 4 mm.

Habitat.—Perak.

Doherty Collection, kindly lent by Mr. Distant.

OTINOTUS MIDAS, n.s.

(Plate LII. figs. 8, 8a.)

Warm brown, with an obscure ferruginous patch below the tegmen. Posterior horn long and straight. Tegmina dense and obscurely veined. Metopidium greyish convex and perpendicular. Legs stout, and, like the underside, concolorous brown.

Size, 9 × 4 mm.

Habitat.—Perak.

Doherty Collection.

GENUS : 0 LEPTOCENTRUS,* Stål.

Hemip. Afr. iv. pp. 87, 90. E. T. Atkinson, Notes on Indian Rhynchota, Journ. of the Asiatic Soc. of Bengal, vol. liv. p. 85.

This genus was separated from Centrotus proper by Stål, and is thus described by him. The posterior horn neither tenuated below, nor amplified in the middle. Acute, three-cornered, distant from the scutellum, and free from the abdomen. Tegmina with five apical and two discoidal areas, none of which are petiolated. The tibiæ simple.

W. F. Kirby notes nineteen species as represented in the British Museum. The type seems to be 0 *Centrotus bos* of Sign. Arch. Ent. ii. p. 336 (1858) with the synonym 0 *Centrotus altifrons*, Walk. l.c. p. 608.

0 LEPTOCENTRUS BOS, Sign.

0 *Centrotus altifrons*, Walk. l.c. p. 608.

Black, punctured, clothed with tawny hairs. Metopidium rising vertically from the head. Suprahumerals rather small, prismatic, divergent and recurved. Posterior horn very slender, and curved downwards; abdomen grey above. Tegmina pale.

Size, 7 × 8 mm.

Habitat.—Congo, Calabar.

0 LEPTOCENTRUS CANESCENS, n.s.

(Plate LIII. fig. 1.)

Dull brown. Suprahumerals slender, acute and slightly recurved. Posterior horn sharp, slender, and disengaged from the scutellum. The front of the metopidium grey, covered by a dense and fine pilose coat, which extends partly down the dorsum and under the tegmina. Legs rather slender and not dilated. Tegmina brownish-hyaline.

Size, 9 × 4 mm.

Habitat.—Belize, Honduras.

0 LEPTOCENTRUS IMITATOR, n.s.

(Plate LIII. figs. 2, 2a.)

In general form not unlike the last-named insect, but smaller, and the tegmina more rounded at their apices. A broad white patch encircles the base of the long posterior horn, and extends over the metopidium and the underside of the thorax.

There is a dark arched streak which connects the two eyes. Legs brown. The tegmina are warm fuscous at their rounded apices. Suprahumerals acute and divergent.

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* From λεπτον and κέντρον, slender horned.

Size, 7 × 4 mm.

Habitat.—Ceylon.

E. Green Collection.

0 LEPTOCENTRUS LEUCASPIS, Walk.

(Plate LIII. figs. 3, 3a, 3b.)

0 *Centrotus leucaspis*, Walk. l.c. p. 158.

Black. Pronotum subpunctate, with long suprahumeral horns, slightly ascending and curved backwards. Two white tomentose spots occur on the dorsum, or else one large one, slightly divided. Posterior apical horn slender, rather arcuate, free from the dorsum and reaching almost to the tips of the tegmina. Tarsi ferruginous. Tegmina each with five apicals, membranes testaceous, with a dense costa. The white patches are most marked in the females.

This species appear to be commonly diffused. I have examples with slight differences in the development of the lateral horns from Madras, Sikkim, Ceylon, Java, the Philippines, and Timor. The island forms have the shorter suprahumerals.

Walker says that this species is erroneously recorded as *C. taurus*, in his Cat. Hom. p. 602.

Some species are white on the pectus.

Size, 8 × 4 mm.

Habitat.—India, Java, Philippine Isles.

0 LEPTOCENTRUS MEPHISTOPHELES.

(Plate LIII. fig. 4.)

This insect differs from *L. leucaspis* in wanting the white tomentose patches on the dorsum, and in the browner colours of the pronotum. The abdomen of the male is stout and ringed, and the pronotal posterior is shorter and rather more curved. The suprahumerals are somewhat slender, but variation is common as to their curvatures. The tegmina are hyaline.

Taken by Dr. J. Pilcher in August in the Sikkim Himalayas at an elevation of 2800 feet.

Size, 8 × 4 mm.

Habitat.—India.

0 LEPTOCENTRUS GAZELLA.

(Plate LIII. fig. 5, 5a. ♀.)

0 *Centrotus gazella*, Fairm. l.c. p. 510 (?).

Much like *L. leucaspis* without the grey patches on the pronotum, but the posterior horn is shorter and the abdominal rings are edged with fuscous yellow.

Though Fairmaire notes that the scutellum is white at the base, I am inclined to think this is a slight sexual character, or possibly only climatic.

Size, 8 × 5 mm.

Habitat.—Ceylon.

0 LEPTOCENTRUS ADUNCUS, n.s.

(Plate LIII. fig. 6.)

Dark fuscous, shining and punctured. Suprahumerals short and auriculate. Posterior horn stout at the base and short. Tegmina fuscous. Frons hairy.

Size, 8 × 5 mm.

Habitat.—Luzon, Philippine Isles.

0 LEPTOCENTRUS USTUS, ♂, n.s.

(Plate LIII. fig. 7.)

Small, nearly black in colour. Posterior horn very slender and thin at the base. Tegmina lustrous, with fine brown neuration. Abdomen stout, and nearly as long as the tegmina. Tibiæ slightly flattened.

Size, 5 × 3 mm.

Habitat.—Ceylon, Madras.

6 LEPTOCENTRUS CINCTUS, n.s.

(Plate LIII. figs. 8, 8a, 8b.)

Small and slender, with rather erect and sharp suprahumerals. Posterior horn rising erect from the dorsum, and then reflected as a thin and free process to the tip of the tegmina. Colour brown, with a broad and white tomentose band at the margin of the pronotum, which band is continued below the abdomen, and covers the coxæ. Tegmina rather slender, with broad yellow neuration, narrow apicals, and with no limbal border.

I could only count two discoidal areas, but an exact mapping out of venation in many species of the Centrotidæ is hardly attainable.

Size, 7 × 3 mm.

Habitat—Calcutta.

Three specimens.

6 GENUS : CENTROTYPUS.

Stål, Hemip. Afr. p. 88. Œfv. Vet. Akad. Forst. p 281, 285. Atkinson, Indian Rhync. p. 87.

Posterior process not sinuated on either side from the base of the scutellum, but covering all, or nearly all of it. Tegmina with five oblong apical areas. Costal area mostly punctured at the base. Suprahumerals often largely developed and broadly dilated at the tips.

CENTROTYPUS FLEXUOSUS, Fab.

(Plate LIV. fig. 1.)

Centrotus flexuosus, Fairm. l.c. p. 516. *C. anchorago*, Guier.

Large. General colour steel-blue or blue-grey. Shining, much punctured. Pronotum produced behind into a long straight thorn, projecting beyond the abdomen. The anterior part expanded into two flattened and widely extended suprahumeral wing-like processes, somewhat of the form of a hammer-head. Abdomen fusiform, ringed, and free above the pronotum. Apex in the female furnished with large genital valves. Tegmina hyaline, and finely bordered with rich warm brown, leaving the two discoidal areas clear and transparent. Apical areas 4–5. Legs long and stout. This is a remarkable insect, and not infrequently met with.

I have specimens from Java in which the suprahumerals are more pronounced, but these insects are not shining or glabrous, but dull brown, and the tegmina are redder in colour.

The legs have a silvery pubescence, and are quite concealed under the body.

This insect appears to be widely spread in India and eastwards. I have examples from Java and from Burma slightly differing in size, which, however, I do not consider distinct.

Expanse of wing, 18 mm.

Size, 10 × 6 mm.

Habitat.—Perak, Silhet, Malacca.

C. anchorago is described as having the tegmina sub-vinaceous in colour.

PROPERTY OF
Z. P. METCALF

CENTROTYPUS ALATUS.

(Plate LIV. figs. 2, 2a.)

Suprahumerals very broad and dilated. Colour warm vandyke brown, with shining corrugated ridges. Tegmina delicate and hyaline, but the apices are rather ochreous. Posterior horn long, quite as long as the tegmina. Frons hirsute and ferruginous. Legs slightly spatulate.

Size, 11 × 4 mm.

Habitat.—Perak.

Doherty Collection.

CENTROTYPUS TIBIALIS, Dory.

(Plate LIV. figs. 3, 3a.)

Centrotus tibialis.

Smaller, with the suprahumerals arcuate and pointed instead of dilated. Posterior horn sharp and projecting far beyond the abdomen. A white tomentose patch occurs in the region of the scutellum. Abdomen ringed and sordid ochreous in colour. Legs yellow. Tegmina with broad dark fuscous costal areas, dark brown neuration and a corrugated limbus. Wings delicate and hyaline. Metopidium high and very pilose. Suprahumerals short, divergent, and not flattened.

Size, 8 × 4 mm.

Habitat.—New Guinea.

CENTROTYPUS SECURIS, n.s.

(Plate LIV. fig. 4.)

The pronotum is broadly expanded between the suprahumerals into an axe-like form, which with the pointed posterior process suggests a pickaxe. The insect thus appears as broad as it is long. The pronotum quite conceals the legs from the view above.

The colour blue-black, glabrous, the horn deeply punctured, but with strong carinal edges. Tegmina sordid ochreous.

By the front view the suprahumerals are thin and divergent.

Size, 11 × 7 mm.

Habitat—Burma.

This description does not agree with *Centrotus malleus* or with *C. malleator* of Walker.

CENTROTYPUS ATER.

(Plate LIV. fig. 5.)

Whole pronotum dull black. Suprahumerals stout, broad, acute, and slightly recurved. Pronotum quite covers the abdomen and legs. Tegmina with thick brown nervures with the costal areas brown, and each with a dark triangular spot at the basal margin; the membrane otherwise is hyaline. The pronotum is arcuate in front, but allows the head and eyes to be visible above.

Size, 14 × 11 mm.

Habitat.—Ruby Mines, Burma.

Doherty Collection.

GENUS: IBICEPS, n.g.

Characterised by long, erect, suprahumeral processes, which are markedly reflexed at their tips, at an angle. The posterior horn, though distant, is not elevated above the margins of the tegmina. These last organs are somewhat pointed at their tips, and furnished with five narrow apical areas, and either two or three discoidals, but the neuration is not constant in all the species, and the discoidals may be subdivided by furcation.

O IBICEPS FALCATUS, n.s.

(Plate LIV. fig. 6.)

Concolorous sienna brown. Suprahumerals long, stout, flat, divergent and reflexed at an angle when viewed from the back. Posterior horn carinated, longer than the abdomen, and concealing the scutellum. Legs small and not much dilated. Tegmina pointed at their tips, hyaline but rather fumose, with long brown parallel nervures, discoidals two, with basal sub-divisions.

Expanse, 14 mm. Size, 7 × 8 mm.

Habitat.—Murray Bridge, South Australia.

Mr. J. Tepper's Collection, taken in November.

O IBICEPS ANSATUS, n.s.

(Plate LIV. figs. 7, 7a, 7b.)

Uniformly shining fuscous. Metopidium rises high and perpendicularly above the frons, and then diverges into two bent suprahumerals. A strong carina runs from between the eyes to the point of divarication. Scutellum concealed, but the posterior horn rapidly narrows into a taper, curved apex, reaching nearly to the tips of the tegmina.

Abdomen pale fuscous. Two patches of inconspicuous yellow occur, one behind each eye, and another on each side of the dorsum. Eyes prominent and sub-cylindrical.

Tegmina long and brown, with five apical and two (three ?) discoidal areas. Apical tips of wing ochreous.

Two specimens, one a female.

Habitat.—Mount Alexander, New Guinea, at 2000 feet elevation.

The figure is shortened by perspective.

Size, 9 × 9 mm.

O IBICEPS LABATUS.

(Plate LV. figs. 1, 1a.)

Pronotum brown and coarsely punctured. Suprahumerals thin and flat by the front view, but broad and angularly reflexed at the tips by the side aspect. Pronotal horn stout and slighly sinuous. An irregular yellowish patch occurs under each wing-insertion, and another on each costa of the tegmina The membrane fuscous hyaline, and marked by strong fuscous nervures showing four apical areas. Abdomen and legs brown.

This insect is closely allied to O *Ibiceps urus*, the next species.

The female is larger and redder.

Size, 10 × 6 mm.

Habitat.—Timor, Haite.

Though closely allied to O *Centrotus urus* of Fairm., it cannot be the same insect, unless imported to the island.

O IBICEPS URUS, Fairm.

(Plate LV. fig. 2.)

O *Centrotus urus*, Fairm. l.c. p. 516, Pt. 3, fig. 16.

Pronotum all black, shining and punctured. Suprahumerals long, wide spread, with obtusely hooked recurved summits. which are flattened. Legs long, with tibiæ sienna-brown, and longish tarsi. Tegmina shining-hyaline and yellowish, with brown nervures. An irregular greyish patch occurs under the wing-insertions, and a small patch also on the scutellum.

Size, 10 × 8 mm.

Habitat.—Sierra Leone (Fairm.). St. Domingo (B.M.).

B.M. Collection.

O IBICEPS LAMINIFER.

(Plate LV. figs. 3, 3a.)

Suprahumerals flat and rounded when seen from the back, but spreading and flat by the frontal aspect. Eyes large. General colour rich brown, roughly punctured and pitted. Legs short and sienna brown. Tegmina warm hyaline, corrugated with warm brown neuration.

I am doubtful if this insect can be identical with Walker's O *Centrotus laminifer*, l.c. p. 159, which has the *habitat* Sarawak, Borneo. My specimen was drawn with the *habitat* noted Singapore, and it is also labelled Australia.

Size, 7 × 4 mm.

A singular insect was consigned to me with no *habitat* assigned, which has some affinity with Ibiceps, yet it must be distinct, inasmuch as it has a strong recurved caudal process at the end of the posterior horn. I thus describe it.

O DAIMON SATYRUS, n.g. and n.s.

(Plate LV. figs. 4, 4a, 4b.)

Suprahumeral horns strongly palmate, divergent and corrugated. The dorsal ridge of the posterior horn sharply serrated. General colour sooty black, with the eyes and the femora orange yellow. Tegmina fuliginous, with two conspicuous white transverse bars, traversed by black nervures. The posterior horn is lobed at the above uncinate process.

Size, 5 × 4 mm.

Heine Collection.

SMERDALEA HORRESCENS.

(Plate LV. figs. 5, 5a.)

Fowler, l.c. Tab. X. figs. 7, 7a, 7b, p. 162.

A stout and rugose species. Head produced in front, with distinct ocelli, above which there are two or three depressed and shining callosities, which at first sight might be mistaken for additional ocelli.

Suprahumerals, long, antlered, and serrated. Pronotum distinct and truncate, with a long posterior process free above the scutellum, dilated at the base, then narrowed and strongly trispinose like a bird's foot. Tegmina with five apical and one discoidal areas. Posterior tibiæ serrated at their outer margins.

Canon Fowler remarks that this singular spinose and piebald coloured species is allied to Bocydium, near which he thinks it might be located.

Size, 11 × 5 mm.

Habitat.—Bugaba, 1000 feet elevation.

GENUS: CAMPYLOCENTRUS.

Stål, Œfv. Vet. Akad. Förh. p. 289 (1869). Fowler.

The chief character by which this genus may be known is the conspicuous node or swelling on the undersurface of the pronotal horn. The species appear hitherto to be almost confined to the American continents.

CAMPYLOCENTRUS HAMIFER.

(Plate LV. figs. 6, 7, 7a.)

Fowler, l.c. p. 149.

Concolorous brown, but greyish black and punctured on the pronotum. Suprahumerals stout, and curved a little backward, with a strong medial carina. The posterior apex of the pronotum sharp, and reaching nearly to the tips of the tegmina. Two conspicuous white oval patches occur on the dorsum below the shoulders. The tegmina are warm brown, corrugated, and with an obscure fuscous spot above each costa. Legs moderately long, as also are the tarsi.

The genus Campylocentrus of Stål seems to be rather mixed in species, as it includes *C. curvidens*, *C. subspinosa*, and *C. hamifer*, all of Fairmaire.

Fowler includes this last species as a synonym, but it does not well answer to Fairmaire's description, "Entièrement noir," with the pronotum "portant en dessous une dent carrée."

The insect named *Centrotus hamifer* by Walker, with the *habitat* Natal, must be a distinct species.

Size, 8 × 4 mm.

Habitat.—Bugaba, Panama.

This appears to be an abundant insect, and occurs in many parts of America.

CAMPYLOCENTRUS CAVIPENNIS, Fowl.

(Plate LV. figs. 8, 8a.)

Fowler, *Gnamptocentrus cavipennis*, l.c. Tab. IX, fig. 16, p. 153.

Very shining dark brown, or with a blue-black sheen.

The discs of the tegmina furnished with a concave discoidal area, the circumference of which is raised and forms a cup-like depression, whence the specific name. The points of the suprahumerals are blackish, as also are the legs. A small yellow spot is on the scutellum, and the eyes also are yellow. There often is a tomentose spot on the dorsum, which, however, is easily rubbed off. The node under the posterior horn is large and swollen.

Size, 7 × 4 mm.

Habitat.—Vera Paz, Guatemala, Panama. Taken from 2000 to 4000 feet elevation.

This and the next described species so much resemble Campylocentrus, that I include it in that genus, rather than group it under Gnamptocentrus as Fowler has done.

The number of the apical and discoidal areas are apparently the same, but nevertheless there is some small difference in the neuration of the tegmina.

CAMPYLOCENTRUS SINUATUS, Fowl.

(Plate LVI. figs. 1, 1a.)

Fowl. *Gnamptocentrus sinuatus*, B.C.A. p. 152.

Small. According to Fowler it is allied to Campylocentrus, with the tegmina furnished with a similar number of apical and discoidal areas, but differently disposed. Colour black or dark brown, pitchy, with a grey pubescence, which is easily rubbed off. Tegmina hyaline, ochreous at the apices, with dark cloudings at the bases, where there is often a luteous spot.

My figure is from the Fowler Collection, but the specimen is partly defective. The suprahumerals are easily seen when viewed from the front. Drawn at a greater magnification. The pronotal horn appears to be recurved and abnormal.

Size, 5 × 3 mm. to 6 × 3 mm.

Habitat.—Teapa, Tabasco, San Juan in Vera Paz, Panama

O CAMPYLOCENTRUS FALCO, n.s.

(Plate LVI. figs. 2, 2a.)

General colour fuscous, punctate, and robust. Posterior horn slightly arcuate and sinuous. A node occurs on the underside. Tegmina ochreous, with broad brown neuration, the base brown and punctate. Rather a large species.

Size, 8 × 4 mm.

Habitat.—Luzon, Philippine Isles.

O CAMPYLOCENTRUS RUGOSUS.

(Plate LVI. figs. 3, 3a.)

Larger than the last species, but like it in colour. The brown pronotum and short suprahumerals are rough and covered with grey pubescent hairs. Posterior horn stout with the node below merged into a sinuous swelling. Tegmina hyaline, but corrugated or crinkled as to the membrane. Scutellum free. Legs ferruginous. Three specimens.

Size, 9 × 5 mm.

Habitat.—Uncertain.

The facies of Campylocentrus is so different in some species that Fowler thinks a separate genus is desirable, and therefore he describes the new genus below.

GENUS: O SPHÆROCENTRUS.

Fowler, l.c. p. 154.

O SPHÆROCENTRUS CURVIDENS.

(Plate LVI. fig. 4.)

O (*Centrotus*, Fairm. l.c. p. 515.) Fowl. l.c. Tab. IX. fig. 17.

Very like Campylocentrus, but the body is elliptic and subglobose. The suprahumerals are short and sometimes cannot be seen. Tegmina are variously marked, sometimes being garnished with white and dark fuscous patches. The posterior horn is stout, with a large dentate process below. The legs robust and clumsy.

Size, 7 × 4 mm.

Habitat.—Chilpanlingo, Guatemala, Costa Rica, Panama.

O SPHÆROCENTRUS CURVIDENS (var?)

(Plate LVI. fig. 5).

Pronotum hirsute on the back. Tegmina dull ferruginous, mottled with fuscous, and with transverse, clear apical areas. Legs ferruginous.

Drawn from an example obligingly lent by Canon Fowler, and labelled *S. curvidens*.

The suprahumerals are short and inconspicuous, and the frons is very pilose. Posterior horn shorter than the tegmina.

Size, 7 × 4 mm.

Habitat.—San Geronimo.

O SPHÆROCENTRUS LUTEUS, n.s. (?)

(Plate LVI. figs. 6, 6a.)

Robust. Suprahumerals small and inconspicuous. The pronotum tumid, and ending in a stout posterior and curved horn with a nodular swelling below, continued as a fine crooked process as long as the tegmina. Surface rough and coarsely punctured all over the metopidium. Tegmina paler and obscurely veined.

Size, 7 × 4 mm.

Habitat.—Adelaide, S. Australia.

Although the above *habitat* is so remote from America there seems to be good reason for placing this species in the above genus, though we know nothing of the life-history of the insect. External morphology of the adult is but a small portion of an insect's history, but the classifier must be content with such materials as fall into his hands. Biology ranges over a wide field, but it is obvious that identification of an insect is necessary before its habits and functions can be discussed.

The important question of distribution of species over the world cannot here be conveniently argued, but it rises when we consider the remarkable paucity of species of Membracidæ over the whole Continent of Europe. The species next to follow in description relates to one of the only two species hitherto discovered in England, though other authors have named several which appear to be varieties only of the above.

Mr. Kirby in his preliminary list of Centrotinæ above referred to, notes twelve species of Centrotus as named by Walker in the British Museum, and he heads this list with the European *Centrotus cornutus* of Linnæus, or more exactly so fixed by Fabricius. I have often taken the node on the undersurface of the posterior horn as a convenient character for many insects, yet I am disinclined to separate so old a type from its well-known generic name of *Centrotus cornutus*, for it would meet with many objectors.

GENUS: CENTROTUS.

Cicada cornuta, Linn. Syst. Nat. p. 435. *C. fusca*, De Geer, Mem. Ins: iii. p. 181. *Centrotus cornutus*, Fab. Syst. Rhyng. p. 16 (1803). Stål, l.c. p. 88 (1866). Fairm. *Centrotus*, l.c. p. 509. Walk. l.c. p. 610.

Stål says, "Tegmina furnished with three apical areas, the hind process of the pronotum distant, with the base curved or geniculate. Hind trochanters unarmed, lateral horns of the pronotum moderate, gradually acuminate, 'extrorsum vergentibus.'"

Only two genera of Membracidæ have been hitherto noted on the Continent of Europe, viz., Centrotus and Gargara. The latter may be distinguished by being without, or with only obsolete, suprahumeral processes, and by the short posterior horn.

CENTROTUS CORNUTUS.

(Plate LVI. figs. 7, 7a. 7b.)

Fieber, *Cicada*, p. 334. Buckton, *Centrotus*, Brit. Cicada, pt. ii. p. 6. L. Melichar, *Centrotus. Cicadinen*, von Mittel-Europa, pp. 15, 16 (1896).

This species has been often described, yet here it may be said to be in colour dark brown and deeply punctured. The suprahumerals connate, short, and slightly recurved, the posterior horn sinuous, with a swelling, nodular protuberance on the under surface. The legs are moderately long and ferruginous. The tegmina with five apical areas and three discoidals are warm brownish in tint, the wings are hyaline.

The presence of such a node would suggest a reference to Campylocentrus, but the insect cannot well be separated from the genus established so long by Fabricius.

This species extends over all Europe, including Norway, Sweden, parts of Russia and Siberia, France, England, Spain, and Italy. I have received eighteen examples from Brockenhurst, in Hampshire, and other specimens from Essex and Kent.

Fieber describes as many as eight varieties occurring in continental Europe, doubtless climatic as to their small differences in form.

De Geer and Reaumur remark that the French peasants in their times gave the name of "le petit diable" to the uncouth horned appearance of this insect when seen from the front aspect.

The British Museum contains species closely allied to the type of *Centrotus cornutus* from all parts of the Old World. Thus we have them from Hong Kong, N. China, the Philippine Isles, Celebes, Malacca, Borneo, Sierra Leone, Calabar and Caffraria. If we admit Centrotoides amongst the Campylocentridæ we must consider the genus as a ubiquitous form of Membracidæ.

Curtis has given a detailed anatomy of *Centrotus cornutus*. Fairmaire discovered the nymph feeding on the oak, and he says that it is quite different from the perfect insect. The prothorax is compressed but without horns, and the abdomen carries "à l'extrémité un appendice dont l'usage m'est inconnu."

The old genus is in this monograph restricted to a few species of somewhat doubtful position, amongst which I name the next described. The student is referred to Plate LX., figs. 5, 6, and 7 at the end of these diagnoses, where some of these last insects are drawn.

O CENTROTUS NECTARIS, n.s.

(Plate LVIII. figs. 4, 4a, 4b.)

Colour sordid ochreous yellow. Pronotum with two short suprahumeral horns, otherwise unarmed. Dorsal outline straight, apex of posterior horn extending to the tips of the tegmina. Tegmina hyaline and coarsely veined with yellow. Frons broad, with small black eyes. Legs stout, tibiæ broad, tarsi longish, particularly the hind ones.

The pupæ are smaller than the imagoes, with a broad but short overhanging pronotum and an obtuse hump. Wing-cases obvious. Abdomen stout and deeply ringed, the extremity ending in a conical process like a nectary, from which the insect at will can protrude a long taper tube, which is tipped with crimson red. This tube discharges a liquid which is greedily sought by certain large ants, many of which were observed to gather it, much in the same manner as they so do from Aphides. These observations, made by Mr. E. Green, establish Bates' statement that certain species of Membracidæ are attended by ants for their sweet secretion, but which had been before doubted by some. The larvæ of *Centrotus nectaris* are gregarious, and they commonly affect the shoots of succulent plants. Through the courtesy of Mr. Ernest Green I am enabled to describe this species, and other of Centrotidæ, with examples of which he has furnished me.*

Mr. Green observes that these insects can leap to a considerable distance, but can be, nevertheless, easily caught between the finger and the thumb.

They feed on several leguminous plants and trees, as Adenanthera and Albizzia, and they may be found at certain times of the year, in all stages of development, crowded together on the shoots in companies.

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* See also E. E. Green on the extensile organ of the larva of a Centrotus, Ent. Mag. for January 1901. Also the same author on the attractive properties of certain larval Hemiptera, Ent. Month. Mag. for August 1900, p. 185.

Size, 7 × 5 mm.

Habitat.—Peradeniya, Ceylon.

CENTROTUS CRINITUS, n.s.

(Plate LX. fig. 5. ♂.)

Pronotum with blunt connate suprahumerals. Posterior horn long and rather incurved. General colour pale brown, with an abundance of short pilose covering on the metopidium above the shoulders and below the tegmina. Legs pale. Wings hyaline.

Size, 5 × 3 mm.

Habitat.—Ceylon.

From Mr. E. Green's Collection.

The female is larger than the male, with a stouter posterior horn, and is less pilose on the front and sides.

Size, 6 × 4 mm.

CENTROTUS SELENUS, n.s.

(Plate LX. fig. 6.)

Suprahumerals rounded and black at their tips, and acute by the front aspect. Sordid ochreous with a yellow pubescence. Posterior horn short. Frons hirsute. Legs yellow. Tegmina dusky greyish, with obscure yellow neuration.

Size, 5 × 3 mm.

Habitat.—Myitta, Tenasserim Valley, India.

Doherty Collection.

CENTROTUS FLAVOLINEATUS, n.s.

Colour sordid ochreous and pale fuscous. A bright yellow line down the pronotum, and another on each side of the same, extending to the eyes. Suprahumerals short and connate. Black, as also is the posterior horn, which last does not extend to the tips of the tegmina. Legs yellow. Tegmina with strong brown neuration, marking five apical and three discoidal areas.

Size of ♀ 9 × 4 mm.

Habitat.—Myitta, Tenasserim Valley.

Doherty.

There are three male and two female examples in Mr. Distant's Collection, kindly lent for description.

CENTROTUS ORCUS, n.s.

(Plate LX. figs. 7, 7a, 7b.)

General form robust and broad between the shoulders. Suprahumerals short, connate and stout. Pronotum narrowed to a short, almost stylate posterior horn.

Colour sordid olive-green, with ochreous tips to the tegmina. Frons and metopidium hirsute. Legs olive. Tegmina with five distinct apical and three discoidal areas.

Size, 5 × 3 mm.

Habitat.—Philippine Isles.

O PYRAMBA AURIFACIES, n.g. and n.s.

(Plate LVIII. figs. 5, 5a, 5b.)

This is a conspicuous insect, from its gay and bright colours of orange, black and grey.

The shoulders are developed into black, acute and moderately sized suprahumeral horns, which are finely serrated on their convex edges. The pronotum is short and rapidly narrows below the suprahumerals into a long taper posterior horn to the tips of the tegmina. A broad irregular orange band occurs on the metopidium, which passes to the dorsum, only interrupted by a black streak from the base of each suprahumeral process.

The thorax has a grey patch on each side, above the wing-insertions. The abdomen is grey and ringed. The tegmina obscurely hyaline, with the clavus smoky. Legs warm ferruginous. Frons tumid, black, with conspicuous setaceous antennæ.

Size, 8 × 4 mm.

Habitat.—Jamaica.

Possibly this may prove to be identical with O *Callicentrus aurifascia*, Stål, and O *Centrotus aurifascia* of Walker's list, l.c. p. 618 (1857), which last has the same *habitat.*

O POGON INCURVATUM, n.g. and n.s.

(Plate LVIII. figs. 6, 6a–6c.)

May be distinguished by its almost obsolete posterior horn, and by the curved neuration of the tegmina.

Suprahumerals stout and thorn-like, recurved, and divergent. Scutellum exposed and conspicuous. Posterior horn very short, not so long as the scutellum, and like it, cleft at the apex. Abdomen broad, pale umber brown, like the rest of the insect. Tegmina pointed, much paler brown in colour, with darker fuscous waved markings, which are partly followed by the curved dark neuration. The five apical areas are bounded by these curved nervures and those forming the two discoidal cellules. The posterior horn is less than half the length of the abdomen.

Expanse, 12 mm.

Size, 6 × 4 mm.

Habitat.—Ceylon.

Wollaston Collection.

O OTARIS AURITUS,* n.g. and n.s.

(Plate LIX. figs. 1, 1a.)

Suprahumerals strongly divergent. Pronotum very short, as also is the posterior horn, which is almost obsolete. General form of the insect deltoid, or triangular. Tegmina dense brown. In appearance it somewhat recalls *Hoplophora concisa*, but the short pronotum well exposes the scutellum. The posterior horn is blunt, and is much shorter than the broad abdomen. The colour dense brown with punctuation. The legs also quite differ from the genus Hoplophora. The suprahumerals are blunt when viewed from the back, but acute and set at right angles as seen from the front.

A comparison with O *Platycentrus obtusicornis* also leads to the conclusion that the insects are quite distinct, which in a measure is borne out by their different *habitats*. It is not represented in the B.M. Collections.

Size, 8 × 4 mm.

Habitat.—Sumatra (Janson).

O

GENUS: TRICOCEPS, n.g.

Distinguished by its high metopidium, the breadth between the suprahumerals, its curved posterior horn without an inferior node, and by the hirsute clothing of the body.

O TRICOCEPS BRUNNEIPENNIS. ✓

(Plate LVI. figs. 8, 8a.)

Small, brown, hirsute, flat between the suprahumerals, with the eyes large. Posterior horn stout, without sinuation, free above the scutellum. Two white patches occur, one on each side above the tegmina, and two additional spots below them. The legs are yellow and very pilose. The tegmina hyaline short, with brown at their bases, with corrugated membranes, bounded by coarse yellow neuration.

Size, 5 × 4 mm.

Habitat.—Natal.

GENUS: O OPHICENTRUS.

Fowl. l.c. p. 156.

May be known by the peculiar serpentine form of the posterior horn. The tegmen has five apical and two discoidal areas on the corium, as shown by the type insect following.

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* From ὠτίς, a horned bird, a bustard.

OPHICENTRUS NOTANDUS.

Fowl. l.c. Tab. IX. fig. 26.

Taken at 2500 to 4000 feet elevation. This species I have not seen, but two others I add below as doubtless belonging to this genus although they are not American.

Habitat.—Panama.

OPHICENTRUS VARIPENNIS, n.s.

(Plate LVII. figs. 1, 1a.)

Rugose. Metopidium high and tumid. Suprahumerals short, recurved, divergent, and not easily seen by the profile view. A stout process rises between them, with a knob from which a marked serpent-like, sinuous horn is continued to the apex of the tegmina. Colour uniformly umber-brown, which prevails on the stout and hirsute legs. The tegmina smoky hyaline and paler, with dark brown neurations enclosing five apical areas, more or less rounded in shape, bordered by a distinct limbus. The metopidium is hirsute.

Habitat.—Old Calabar.

Probably this insect is allied to *Centrotus varipennis* of Sign., l.c. p. 337 and Stål, l.c. p. 95, which has apparently the same *habitat.*

OPHICENTRUS TRISPINIFER.

(Plate LVII. figs. 2, 2a.)

Centrotus trispinifer, Fairm. l.c. p. 515.

Somewhat of the same colour as *O. varipennis*, but the origin of the posterior horn is developed into an erect process before it is continued backward over the abdomen. In this position, between the two suprahumerals, the appearance is as if it were tri-spined. The tegmina are fuscous, and the membranes are corrugated, with warm brown veinings. There is a white patch on the scutellum. The posterior horn is strongly sinuous, as in the last species.

On account of this serpent-like character, but with some doubt, I include this species in the genus Ophicentrus. In the British Museum there are specimens labelled *trispinifer* from Tasmania, which is the same *habitat* given by Fairmaire in his "Révue des Membracides." My specimen retains the fine setaceous antennæ issuing from the pilose frons.

OPHICENTRUS CURVICORNIS, n.s.

(Plate LVII. figs. 3, 3a.)

Metopidium high. Suprahumerals rather long, acute, arcuate, and curved at their tips. Pronotum roughly punctured at the bottom of fine furrows. Colour dark ochreous-brown. Posterior horn uniformly cylindrical, undulating, or sinuous, without rugosities. Underside, part of the scutellum, and the legs sordid ochreous. Abdomen ringed with dark brown. Tegmina sordid ochreous-yellow, with a blackish apical margin. A costal spot and a short brown bar from the lower marginal edge, also black. Nervures brown and strongly marked.

Though somewhat aberrant from the genus, I include it provisionally as before, partly from the character of the pronotal horn.

Size, 10 × 6 mm.

Habitat.—Stephansort, German New Guinea.

δ GENUS: RABDUCHUS,* n.g.

O RABDUCHUS GNOMON, n.s.

(Plate LVII. figs. 4, 4a.)

Colour dark brown, glabrous, and punctured. Metopidium rising perpendicularly and tumid, or else slightly inflated behind the dorsal part of the pronotum. This suddenly ends in a narrow and cylindrical horn, which is straight and carried nearly to the apex of the tegmina. Tegmina warm brown, pale, showing five apical oblong areas and several discoidal areas, but the neuration is difficult to follow.

The female is larger than the male, and is hirsute. The male has a small conical hump on the back of the abdomen.

Size, 6 × 4 mm., ♂; 8 × 4 mm., ♀.

Habitat.—Old Calabar, and the Cameroons, W. Africa.

This genus seems to be allied to the genera Ischnocentrus, Psilocentrus, and Phaulocentrus of Fowler. Their chief difference consists in the absence of suprahumeral processes, or at least their suppression of the same. They also are described as containing American species only.

δ GENUS: PEDALION, n.g.

Suprahumerals short and truncated, or squarely cut off at their tips. Pronotum continued backwards as a long posterior horn, straight at its inferior edge, but expanded at the end into a flat triangular blade having a fanciful resemblance to a boat's rudder. Over the dorsum this process rises into a swelling or dentation. The tegmina have broadly developed limbal borders at their apices.

Hitherto the species seem to be confined to the African continent.

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* ραβδος, a rod.

0 PEDALION TRISTE, n.s.

(Plate LVII. figs. 5, 5a.)

Colour brown, punctured. Suprahumerals short and truncated. Upper edge of posterior horn sinuous and free from the abdomen, nearly as long as the tegmina. Legs rather weak, and moderate in size, simple. Tegmina mottled with brown and ochreous. Limbus corrugated.

The female is larger than the male, and has a body ringed with yellow. The male has greyer tegmina with brown neuration.

Size, 5 × 3 mm., ♂; 6 × 5 mm., ♀.

Habitat.—Cameroons, W. Africa.

0 PEDALION ORNATUM, n.s.

(Plate LVII. fig. 6.)

A larger insect, and more conspicuous from its spotted ochreous tegmina. The posterior horn is rudder-like in appearance, pronounced, and free above the tegmina. These are large, and each furnished with a broad corrugated limbus. The membrane is hyaline marked by orange-yellow nervures, all of which are stippled with small brown points or punctures. There appears to be only four irregularly shaped apical areas, but the number is difficult to decide. All the areas are bounded by curved lines. The membrane throughout is much crinkled or corrugated. Underside and the legs brown, with the suprahumerals and metopidium paler.

Size, 6 × 3 mm.

Habitat.—Cameroons, W. Africa.

0 PEDALION DELALANDEI.

(Plate LVII. figs. 7, 7a.)

0*Oxyrhachis delalandei*, (?) Fairm. l.c. p. 268.

Rather larger, and fuscous greyer in colour. Suprahumerals thick, carinated, and truncate by the back view. Posterior horn as before described; the extremity blackish, free above the abdomen, slightly rising in the middle. Tegmina dull hyaline, with pale brown nervures.

Size, 7 × 4 mm.

Habitat.—Natal, Cape of Good Hope.

Lounsbury Collection.

OPEDALION FASCIATUM.

(Plate LX. fig. 8.)*

General colour greyish-ochreous. Suprahumerals blunt, truncated, and carinated. Posterior horn with a swelling on the dorsum, and the usual clavate character at the apex. Tegmina hyaline, glistening with yellow neuration, and marked by two or more obscure transverse bars. Base more ochreous. Legs dilated and yellow.

Size, 8 × 4 mm.

Habitat.—Cape Town.

A note is made that the imagoes emerge in March.

OPEDALION PUNCTIPENNIS, n.s.

(Plate LVII. fig. 8.)

Suprahumerals as seen in profile square and truncated at their tips. General colour dark ochreous, with the dorsal and apical expansions of the posterior horn browner. Legs rather flattened, and ochreous as to the tibiæ. The fore tarsi short. Tegmina smoky hyaline with darker neuration. The costal edge has several brown spots ranged in series, and there are two indistinct blotches on the metopidium.

Size, 7 × 4 mm.

Habitat.—Cape of Good Hope, S. Africa.

Presented by Mr. Lounsbury, Cape Town.

GENUS: OPOLOCENTRUS, n.g.

The posterior horn long, attenuated at its origin, but expanded at the apex into a claviform process, which is often serrated at its undersurface. Suprahumerals are unequal as to their length, but generally they are not much developed.

OPOLOCENTRUS LATIPES, n.s.

(Plate LVIII. figs. 1, 1a.)

Suprahumerals erect and rather long. Metopidium high. Eyes large. Colour concolorous dark brown. Posterior horn stout, with a strongly clubbed apex, which is serrated below. Abdomen robust, ringed, and more rufous in tint. Legs rufous and spatulate, the front tibiæ more markedly so. Tegmina hyaline and slightly pointed at the apices.

Size, 9 × 6 mm.

Habitat.—Natal.

From Mr. Rippon's Collection.

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* An example of this insect was received too late for figuring in its true order, but it will be found drawn on the last plate of this book, as is above noted.

0 POLOCENTRUS RUFUS, n.s.

(Plate LVIII. figs. 2, 2a, 2b.)

Pale, generally ferruginous yellow, but sometimes darker in tint. Posterior horn longer than the abdomen, and equals in length the tips of the tegmina.

Suprahumerals short, and, as they are divergent, they do not appear in the profile view of the insect. Posterior horn expanded at the extremity into a claviform process, which is serrated below. Pronotum developed into a dorsal hump, from which the posterior horn takes its rise.

Tegmina pale ferruginous, with a red venation, and a distinct limbus. Four or five apical, and three discoidal cellules, which are cycloidal rather than rhombic in form. The frons is flat and hirsute, and the tibiæ (more particularly the fore tibiæ) distinctly spatulate.

The underside is concolorous-ferruginous, and the scutellum is covered.

Expanse, 16 mm.

Size, 8 × 4 mm.

Habitat.—Mysore, S. India.

The Hope Collection contains several examples.

Unfortunately my figure is drawn under a less magnification than the other examples of the genus. This species may be taken as typifying the genus Polocentrus.

0 POLOCENTRUS NEUTER, n.s.

(Plate LVIII. fig. 3.)

Dusky-ferruginous with greyer shades on the pronotum. Posterior horn less pronounced in the sinuosities, but expanded and clavate at the apex. Tegmina ferruginous with a red neuration. Suprahumerals short, divergent, and acute.

Size, 6 × 4 mm.

Habitat.—Madras.

Kindly lent by Mr. Distant.

Two specimens, one of which is defective.

0 GENUS: ISCHNOCENTRUS.

Stål, l.c. p. 292.

May be recognised by its very short posterior horn, which stretches out like a short tail from the pronotum.

ISCHNOCENTRUS INCONSPICUOUS, n.s.

(Plate LIX. figs. 2, 2a.)

Small, without suprahumerals. Metopidium short, roundly protuberant on the dorsum, and ending in an abbreviated posterior horn, free above the abdomen.

This horn is slightly longer than that developed in the next described species. Colour dark punctured brown. Abdomen large and ringed. Legs more robust than in *I. niger*. Tegmina simple, membrane hyaline and corrugated, with strong yellow nervures. Eyes large. Frons with a white pubescence like a hoary beard. Proboscis short and stout.

Size, 4 × 3 mm.

Habitat.—Cachabe, "at a low elevation."

Rosenberg Collection.

ISCHNOCENTRUS NIGER, Fowl.

(Plate LIX. fig. 4.)

Fowl. l.c. Tab. IX. fig. 19, p. 155. ? *I. ferruginosus*, Stål.

Very small. Pronotum short, and tinged with faint dark-ochreous, punctured. The posterior process is very short, nearly straight, and raised quite clear of the scutellum. Tegmina dark, the apical ends hyaline, with strong dark neuration.

There is an obscure whitish patch below the suprahumerals, which are obsolete. Legs with ochreous knees.

Size, 4 × 2 mm.

Habitat.—Volcan de Chiriqui, Colombia, 4000 feet.

Fowler Collection.

Except from its small size, and that Ischnocentrus has no suprahumeral horns, the genus Rabduchus might almost be merged in Ischnocentrus, yet the former is not an American species like the last.

GENUS: PHÆROTUS, n.g.

Whole insect globose, tumid. Pronotum roughly tuberculate, particularly on the dorsum. Legs robust, tibiæ not spatulate. Tegmina short and round at the tips. Pronotum partially covers the scutellum.

PHÆROTUS STIPULIPENNIS, n.s.

(Plate LIX. figs. 3, 3a–3c.)

Colour dark fuscous, form globulose. A protuberance on the dorsum, and a swelling before the apex which can scarcely be called a true posterior horn. Legs robust, and ferruginous as to the tibiæ. Tegmina short and rounded, mottled with orange-grey and smoky-blackish stains, furnished with four or five (?) radials, each sparsely studded with small yellowish-red tubercles in rows upon the same. Suprahumerals none. Marginal edge of the pronotum not sinuous.

Size, 4 × 2 mm.

Habitat.—Brunei, Borneo.

GENUS : OPSILOCENTRUS XANTIPÆ, Fowl.

(Plate LIX. figs. 5, 5a.)

Fowler, l.c. Tab. IX. fig. 21, p. 156.

Very like Ischnocentrus, except that the pronotal apex is longer and sinuous instead of straight. Pronotum dusky-brown and hirsute. Horn black at the tip and the base, but ochreous in the middle. A white dusky spot occurs below the insertion of the wings, and a crooked streak in advance of it. Tegmina hyaline at the tips, and fuscous at the bases; four apical areas are marked by a strong neuration. Legs rather long. There is a brown fascial mark near the clavus.

Size, 6 × 3 mm.

Habitat.—Xantipa in Guerrero, Mexico.

Fowler's Collection.

GENUS : OEMPHUSIS, n.g.

Pronotum without suprahumeral horns, tumid and crescentic in form, much punctured. Tegmina variegated with rich brown. Hind tarsi short.

OEMPHUSIS TUMESCENS, n.s.

(Plate LIX. figs. 6, 6a, 6b.)

Pronotum tumose, semilunate, curved at the shoulders like a crescent, with the hinder part extending into a long horn, reaching to the tip of the abdomen. Metopidium rather high and convex. Abdomen greyish green, robust, and ringed. General colour of the insect bluish-black, shining and deeply punctured. Tegmina long, with the membrane crinkled, rich sienna brown on the costal and the apical areas, and with a brown streak on the clavus. The rest of the membrane, and the wings, clear hyaline. Legs fuscous with the hind tibiæ short.

Expanse 20 mm. Size 6 × 8 mm.

Habitat—Java. Four specimens.

A rather large and remarkable insect.

GENUS: PHAULOCENTRUS PILEATUS, Fowl.

(Plate LIX. figs. 7, 7a.)

Fowler, l.c. Tab. X. fig. 1, p. 159.

Allied to Tolania, but unlike that genus, as it shows a short posterior process. The number of apical areas in Phaulocentrus apparently is five, but specimens often show six. The genus named by Fitch Uroxiphus, is inadmissible, for it has been preoccupied by Amyot and Serville for different insects.

Ph. pileatus is pubescent, with the base of the tegmina lighter in colour. Head with two distinct tubercles. Upper part of the pronotum furnished with a rather marked circular disc, with a carina cutting it through the midst. Tegmina dull pubescent, with pale testaceous veins and with a fuscous spot towards the apex of the clavus. The general colour is testaceous. Eyes large. There are no suprahumeral processes.

Size, 7 × 3 mm.

Habitat.—San Geronimo, 3000 feet.

Fowler's Collection.

Three other species are named by Fowler, viz., *P. proximus*, *P. sordidus*, and *P. cornutus*, all of which also are American species.

GENUS: GLISCHROCENTRUS.

G. cucullatus, Fowl. l.c. Tab. X. fig. 5, p. 161.

GENUS: CENTRUCHOIDES.

C. laticornis, Fowl. l.c. Tab. X. fig. 6, p. 162.

The last genus is allied to Centruchus, Stål, and, like the former genus, it is American. *C. laticornis* has rather large truncated suprahumerals, which do not appear to be the modifications of a secondary sexual character.

GENUS: MÆROPS MIXTUS, n.g. and n.s.

(Plate LIX. figs. 8, 8a.)

Globose, without suprahumerals. Pronotum evenly convex, or nearly so, from the head to the blunt posterior apex. Colour sordid yellow or rufous. Tegmina short and rounded, with three faint brown fasciæ crossing the coarse brown nervures. The disc has faint white areas which give a general mottled appearance to the wings. Legs strong and flattened, but not spatulate. Frons short, but narrow, and very pilose.

Size, 5 × 3 mm.

Habitat.—Balongoda, Ceylon.

GARGARA GENISTÆ.

(Plate LIX. figs. 9, 9a, 9b.)

Fab. (*Membracis genistæ*), l.c. p. 677. Fairm. l.c. p. 520. *Smilia*, Germ. *Oxyrhachis*, Burm. p. 133. *Gargara*, Am. et Serv. p. 537. Curtis, *Centrotus*, Brit. Entom. Pl. 313. Buckton, *Centrotus genistæ*, Brit. Cicadæ, vol. i. pl. ii. figs. 8, 9, 10. Dr. L. Melichar, *Cicadium*, Taf. figs. 23–27, p. 16.

Black or reddish-brown, punctured and pubescent with greyish hairs. Tegmina hyaline at the tips, with fuscous nervures, more or less hairy. Legs black or fulvous. The hind tarsi were clearly trimerous-jointed in the specimens examined, and were without suprahumerals. Pronotum convex and smooth.

Size, 4 × 2 mm.

Habitat.—England, the Tyrol, and Europe generally.

Feeds on *Ononis* and *Medicago*. Also on *Genista tinctoria* in July and August.

Mr. Kirby notes as many as thirty species under the genus Gargara, of which twenty species are represented in the British Museum.

BRACHYBELUS CRURALIS, Stål.

(Plate LX. figs. 2, 2a.)

Stål, l.c. p. 48. *B. cruralis*, Œfv. Vet. Ak. p. 292. Fowler, l.c. Pl. IX. fig. 18.

A small dark American species. Colour brownish-black; of an oval form, and covered with a greyish pilose coat. There are no suprahumerals. The pronotum smooth and convex from the metopidium to the dorsum, and ending in a thin posterior horn, the point of which reaches to about half the length of the tegmina. Legs yellow. The tegmina have broad fuscous nervures, which enclose five more or less rounded apical areas crossed by brown blotches, which give the wings a mottled appearance.

The metopidium and the frons ovoid by the front view, and pilose.

Size, 4 × 3 mm.

Habitat.—Teapa, Tabasco, Mexico, and Panama.

GENUS: TOLANIA, Stål.

Stål, l.c. p. 248. Fowl. l.c. p. 16.

Genus Tolania may be said to be transitional amongst the Centrotidæ, yet until Stål separated the genus, it was regarded as a true Centrotus. Mr. Kirby in his list includes seven species, besides those I figure below.

OTOLANIA OBTUSA.

(Plate LX. figs. 3, 3a, 3b.)

Fowl. l.c. p. 166, Pl. X. fig. 14.

Head wide between the eyes, and finely striated. The suprahumerals, if visible, are suppressed or almost aborted. Colour concolorus brown. Posterior horn very short, much shorter than the abdomen. Tegmina fusco-hyaline, with the areas somewhat variable as to their shapes. Legs short and spotted.

Size, 7 × 4 mm.

Habitat.—Vera Paz, Guatemala, Panama.

OTOLANIA OPPONENS, Walker.

(Plate LX. figs. 4, 4a.)

Walk. l.c. p. 159. Fowl. l.c. p. 166, Tab. X. figs. 12, 13.

Canon Fowler notes that there are forty examples of this species in the B.C.A. collection, which generally show their inconstancy as to the amount of suppression of the suprahumerals. My figure shows this deficiency markedly. The legs are ciliated.

Size, 6 × 3 mm.

Habitat.—Vera Paz, Panama.

From the Fowler Collection.

Before closing the diagnosis of species of this monograph, it may be noted that there is still an abundance of material which has yet to be worked over. There is a charm in the belief, and some truth in the idea of simplicity, and some will think that an error has been committed by the author in proposing so many new genera for this group of insects. But the above unworked material chiefly stands under the indefinite old genus Centrotus, and thus it requires restriction. There are a few species which do not seem to fall well under the genera here proposed, and these are figured as an addendum. Some examples which may be included in the genus Centrotus are diagnosed as such in their series, although their characters are drawn out of place on the last Plate LX.

GENUS: OTAURIONA OBESUM, n.g. and n.s.

(Plate LX. fig. 9.)

Large, very robust in form. Metopidium high, and surmounted by strong, acute, and rather reflexed suprahumerals. Pronotum broad, and covering the scutellum. Head yellow. Posterior horn not narrowed suddenly, but thinning gradually to the apex, which exceeds the length of the abdomen. This last is robust and heavy, and ends in large valves, which in the female contain the excavating saws.

Colour bright ochreous on the metopidium and behind the suprahumerals, the rest pitchy-brown. Tegmina ample and fusco-hyaline, with strong brown neuration, the dark colour is particularly seenon the costal border. The wing of this specimen was defective, but there appeared to be four (perhaps five) apical and only two long discoidal areas. Legs ferruginous and hairy.

Size, 10 × 5 mm.

Habitat.—Paramba; Ecuador.

Taken in the dry season of March.

Rosenberg Collection.

LARVÆ OF CENTROTIDÆ.

I will conclude my illustrations with the figures of several larval forms, which are remarkable, as they so little foreshadow the external characters of the future imagoes. They seem to be as uncouth and bizarre in form as are some of the perfect insects, and they appear to have already commenced their tentative (?) stages of mimicking other things.

Trustworthy figures and descriptions of Pupæ and Larvæ of insects which undergo distinct metamorphoses are much to be prized; the biology of species in fact is not complete without such. Immature forms, when understood, may possibly suggest to the student some distant Phylum, from which a given family group may have sprung by some process of evolution.

Unfortunately the zoologist has often very little time or opportunity for field and forest study in distant countries. Thus it happens that the fœtal conditions, or forms, which we may consider somewhat analogous to such, in the Membracidæ, are almost specifically unknown.

A few of such examples are here introduced, with an apology for the slight information yet obtained, as to even the species which the adult insects represent.

In the introduction to this monograph I have made a few observations as to the early development of these insects. Perhaps the first published notes were made by Dr. H. J. Scheller, and on Plate B, figs. 15, 16, and 17 of the present work, will be found enlarged drawings of the illustrations he gives us; also Plate I. figs. 4–4b, represent the larva and pupa of *Membracis foliata*, and on Plate II. fig. 4a, the singular fan-like larvæ of *Membracis continua*. This peculiar development of the pronotum is likewise shown in the pupæ, figures 13 and 14, on my last Plate LX.

Figs. 10 and 10a belong to another genus which has yet to be substantiated, in which there is a singular club-like process proceeding from the head or just above it. Plate LX. figs. 11 and 11a, also shows a similar development, with the dorsum furnished with two rows of serrated points.

Some excellent remarks accompanied with good outline figures are given on the 'buffalo tree-hopper" (*Ceresa bubalus*) by Mr. C. L. Marlatt ("Insect Life," vol. vii. p. 8). The paper contains almost the only printed record of the life-history and the oviposition witnessed on *Populus monilifer.*

This insect disintegrates the bark by scoring and riddling it, so as to produce much damage to the trees and orchards. The three years' growth of the twigs of apples, maple, willow, and cottonwood, which have a southern aspect, seems to be preferred for oviposition.

The eggs are laid in small compound groups, disposed in two parallel rows of slits.

Marlatt says that when once the operation is begun the female seems to be fearless of interruption. She begins with her saw protruded at right angles to her body, but when the slit is complete the saw lies flat along the abdomen.

At least two minute parasites attack the eggs of *Ceresa bubalus.* One undescribed small Hymenopterous species destroys numerous patches of this pest in Missouri.

The ova of *Ceresa bubalus* are about $\frac{1}{16}$ inch long, curved, tapering, and without sculpturing on the surfaces.

After the completion of the slit the female thrusts her eggs down to the juicy cambium. Each row may contain from six to twelve eggs. Perhaps twenty minutes may be required to complete a row, and then another is commenced alongside.

The spaces between the rows subsequently wither, and this, it is supposed, prevents the lips of the incision from growing over and crushing the eggs.

Adults appear in July and become more numerous in August, when the egg-laying begins, a female producing from one to two hundred eggs.

The ova are not killed by the cold of winter, but they hatch out in the following warm days of May or June.

A small hymenopterous fly, perhaps *Trichogramma ceresarum* of W. H. Ashmead, is parasitic on *Ceresa bubalus*, the larva of which is described as having long spines on its back similar to those of some of the genus *Hoplophora.*

Another example of the larva of *Otinotus exigua* (rather than of the pupa, which always has wing-cases partially developed), is figured on Plate LII. fig. 5a.

Oxyrhachis lignicola has a similar economy in channelling wood for the purpose of oviposition. The complete eggs and the empty shells are represented *in situ*, Plate XLIX. fig. 6c.

ANTS AND MEMBRACIDÆ.

The singular economic relation between ants and members of different orders of insects, (that is, orders separate from the family), has been often commented upon. The particular affection, we may almost call it, of the Hymenopterous ants for their less highly endowed neighbours the Hemiptera, as is instanced by the Cicadæ, Cercopidæ, Aphidæ, and now proved to be the case in the Membracidæ, is an interesting fact, but what is still unexplained is the character or the object of the parasitism which is often connected with it.

Ants are good friends to Membracidæ, and they readily yield up to the former their juices or syrups, which appear to be excretions from organs connected with their renal systems. Much has been written on so-called "honeydew" and its supposed connection with the manna of the wilderness. It is obvious that the herding of Aphidæ in some ants' nests, presumably for the honeydew, which Boussingault says may be secreted by the pound-weight, cannot explain the herding in such nests of at least sixty different species of beetles, which do not elaborate such sweet liquids.

The economic cause of this affection for the insects of a different order is as yet obscure to us.

Mr. E. Green has given a circumstantial account of the attention afforded by ants to *Ceresa nectaris* of Ceylon, and probably this will not prove to be the solitary instance of such attention. The production of honeydew must be looked on rather as an excretion, and its voidance as a necessary part of the insect's economy, and if so, it must be considered to be a waste product. The fact that the waste product of one animal is often the nutriment of another, is no new condition of the endless resources of natural economy.

DISTRIBUTION.

No attempt has been here made to discuss the Phylum or Stock of the family Membracidæ, for if it could be proved scientifically, it would involve the explanation of some of the most intricate problems of variation and the most obscure phenomena of animal development.

Neither is the question discussed whether particular forms of life may have appeared simultaneously in more than one centre, for the difficulty often is to show consistently, the direction of a spread and its consequences from a single centre. With the exception of the Arctic regions, we may say that the distribution of these insects is world-wide, and that it is not connected primarily with temperature or climate.

Zoological distribution is not controlled so much by the latitude as by the longitude of the globe, that is, it follows more the Isothermal lines which often may govern the vegetation which sustains the particular life of the animals of those regions.

Climate is by no means the chief factor. Geological disturbances and geographical formations cause the upheaval or formation of mountain chains, of wide deserts, dense forests, and ocean currents with their attendant winds. These are more effective isolators of animal life than the cold climates of even high latitudes.

Ancient geology tells us very little of the age of Membracidæ, but we may surmise that Asia was their primitive centre, but if so, their spread into America (now their chief home) probably was from the North, at a time when the ape lived, and the palm-tree flourished in Greenland. This might appear to be the more probable conjecture, since the fauna of America, north of Mexico, point to a colonisation from the more temperate regions of Asia, subsequent to the glacial period.

The Hemiptera were one of the earliest denizens of our earth, and they might have been driven southwards as the great ice cap of America descended, the cold of which doubtless reduced, but did not destroy the genera or their affinities then existing. Many of these were of the great Palæarctic region.

In Asia the distribution of Membracidæ might be from Siberia through China; and from the Malay Peninsula to India and Borneo.

In Africa the occurrence of Centrotidæ is known from Calabar on the West, to Abyssinia and Natal on the East, and to the Cape of Good Hope in the South. In America their range is from Canada to Panama, and thence through Brazil and Ecuador almost to Patagonia in the South. Australia and New Zealand are duly represented, and also the distant Philippine Isles and New Guinea.

The comparative isolation of Europe from the rest of the world as regards the Membracidæ is remarkable. The great Ural and Caucasian chains of mountains seem to have been effective barriers through geological epochs, with the singular exception of three species of Centrotidæ.

But even comparatively narrow sea straits may separate the fauna of two distributary districts. Thus the straits between Baly and Lombock are only in one part ten miles wide, yet the insects show that the Indo-Malayan region is distinct from the Austro-Malayan on the opposite side. (*See* Wallace's "Malay Archipelago," chap. i.).

There would appear to be less competition and struggle for life on islands than on the mainland, yet such is not the invariable rule. The Membracidæ of the Philippines, Sumatra, and Ceylon do not show a higher development in size than those on the neighbouring continents, perhaps they are even smaller. We may note also that the tropical examples of which we have experience, do not contrast unfavourably as to size with the more temperate species of N. America.

With reference to migration of species, we may remember that, though New Zealand is nearer to Australia than to any other large district of land, yet their faunas are almost totally different. The migration of insects (which are on the whole vegetable feeders) may be safely said to follow the lines of distribution of the plants on which they feed. But Huxley, speaking of the flower gentian, says that migration of animals helps nothing as between the Old World and the South American flora. Yet in some way the tapirs of the Andes are connected with the tapirs of the Malay peninsula, though vast oceans intervene. How did they cross these oceans?

It is almost impossible to foresee the effects of a superabundant popular increase of man as to the spread of animals over the earth. His scientific activity interferes with the struggle of the fittest, and tends to the extirpation of those animals which *he* considers may interfere with his own special economy.

But easy locomotion also introduces pests and disease, such as murrains and pibrine, phyloxera and coccus-scale, and the winds even spread "contagions" and scatter unwelcome germs, which tend to restore the natural balance of life, which has for a time been interfered with by man.

We may regret that as useful flocks and herds increase, the interesting creatures of olden times tend to diminish and pass away, never to return.

A dull utilitarian, mechanical age seems to be taking the place of variation, and even affecting the ethics of true art. Yet though "many shall run to and fro, and knowledge shall increase," all is not on the side of extinction. Flowers and beasts appear in new places where they have not been known as indigenous, and landscape has still its charm for those who will see its beauty.

It will be noticed that the Æthalionidæ and the Machærotidæ are not included in the order of this Monograph. Though they are closely allied to the Membracidæ, through the Cercopidæ, or through the Jassidæ, they want certain distinctive characters of the family, which justify their omission.

Short Catalogue of the Sub-family: *CENTROTIDÆ.*

The annexed list, partly compiled from a more extended catalogue communicated by Mr. W. F. Kirby, must lose some of its usefulness by its necessary abridgment. It here states in alphabetical order the genera cited or erected by certain authors mentioned up to the present date. It also gives examples in a general way of species, many of which may be examined in the British Museum of London, but the number of species mentioned by authors is much larger than the limits of this treatise will allow to be given in full.

An estimate of the named species of Membracidæ, amounting to more than twelve hundred, is given in the introduction to this Monograph, but this estimate must be far below the limits actually existing in tropical and temperate climates.

The alphabetical arrangement shows that no systematic series has been adopted in it, though some attempt has been made in the body of this work to construct such from the general external characters of the winged insects.

In this subjoined list, as before noted, the *habitats* are given with the species, which are mostly typical; but this is not meant to imply that the examples mentioned are confined to the locality enumerated, nor of course to the genera or species there named

Zoological genera descriptive in their very names are becoming more and more difficult to be found, they having been long since preoccupied. Some of the genera here proposed will be thought barbarous and unclassical, but a name, used simply as a label, has certain conveniences for future use, as it may not clash in the description of future species with possible immaterial differences, whilst showing characters which are clearly generic.

ABELUS, Stål.

A. luctuosus, Stål, Œfv. Vet. Akad. Förh. 26, p. 294 (1869). Bogota.

ACANTHICUS, Lap.

A. desmarestii, Lap. Ann. Ent. France, p. 228, Pt. 6, fig. 7 (1832). *A. Stollii*, Stoll, Cig. Pt. 16, fig. 85. Two species. Brazil.

ACANTHOPHYES, Stål.

A. albipennis, Stål, l.c. p. 89. **A. chloroticus*, Fairm. (Centrotus c.) Bull. Ent. Soc. Tr. p. 9 (1851). *A. chloroticus*, Walk. (Centrotus) Ins. Saund. p. 82. Three species. Caffraria, Tranquebar.

ACANTHUCHUS, Stål.

A. gracilipennis, Stål, l.c. p. 287. *A. acanthaspis*, Fairm. l.c. (Centrotus) p. 515. *A. trispinifer*, Fairm. l.c. p. 515, Pt. 7, fig. 35. Nine species. Port Jackson.

AMBLYCENTRUS, Fowl.

A. pubescens, Fowl. l.c. p. 158, Tab. IX. fig. 23. Mexico.

ANCHON, Buck.

A. nodicornis, Buck. Mon. of Membra. p. 216, Pt. 48, figs. 1, 1a. *A. rectanguium*, l.c. Pt. 48, fig. 3.

ANOMUS, Fairm.

A. rectangulatus, Fairm. l.c. p. 522, Pl. 7, fig. 31. Brazil.

BOCYDIUM, Latr.

Sphæronotus, Lap. Ann. Soc. Franc. p. 139 (1832), Am. & Serv., Fairm. *B. globulare*, Fab. (Centrotus) Syst. Rhyn. p. 16. *B. globuliferum*, Pall. Spec. Zool. p. 22, Pt. 1. Six species. Brazil.

BOOCERUS, Stål.

B. gilvipes, Stål, l.c. p. 290. Fowl. l.c. p. 149. Mexico.

BRACHYBELUS, Stål.

B. cruralis, Stål, l.c. p. 292. *B. cruralis*, Fowl. l.c. p. 155, Tab. IX. fig. 18.

CALLICENTRUS, Stål, l.c. p. 290.

**C. ignifer*, Walk. (Centrotus) l.c. p. 616. **C. aurifascia*, Walk. l.c. p. 618. Seven species. Jamaica, Brazil.

CAMPYLOCENTRUS, Stål.

C. obscuripennis, Stål, l.c. p. 289. *C. obscuripennis*, Fowl. l.c. p. 150, Tab. IX. fig. 12. *C. hamifer*, Fairm. (Centrotus) l.c. p. 512. Nine species. Cuba, Mexico, Colombia.

CENTRICULUS, Fowl.

C. rufotestaceus, Fowl. l.c. p. 157, Tab. IX. fig. 22.

CENTROCHARES, Stål, l.c. p. 86.

C. horrificus, Westw. (Centrotus) Guer. Mag. Zool. in Pl. 82 (Pterygia), Walk.

CENTRODONTUS, Goding.

C. Atlas, Goding (Gargara) Ent. News, p. 201 (1892). California.

CENTROTUS, Fab.

Cicada, Linn. (Centrotus) Fab. Syst. Rhyng. p. 16. Fairm. l.c. p. 509. Stål, Hemip. Afri. Vol. IV. p. 88. Walk. and others. *Centrotus cornutus*, Linn. (Cicada). *Cicada cornutus*, Buckton, Brit. Cicadæ, p. 6, Pl. 2, figs. 1–7. Melichar, Pt. 1, figs. 18–22, p. 16. Sixteen species (?). England, Europe, Philippines.

CENTROTYPUS, Stål.

C. longicornis, Stål, l.c. p. 285. *C. laminifer*, Walk. (Centrotus) l.c. p. 93, Jour. Linn. Soc. Twelve species. Cambodia, Sarawak.

CENTRUCHOIDES, Fowl.

C. laticornis, Fowl. l.c. p. 162, Tab. X. fig. 6. Panama.

CENTRUCHUS, Stål.

C. fuscipennis, Germ. (Centrotus), Silb. Rev. Ent. p. 256. *C. capensis*, Germ. l.c. p. 256. *C. fuscipennis*, Stål, Hem. Afr. IV. p. 93. Four species. Caffraria.

CERAON, Buck.

C. tumescens, Mon. Membrac. p. 229, Pl. 51, figs. 1–1b. *C. contortum*, l.c. p. 229, Pl. 51, figs. 2, 2a,

CORYTHOPHORA, ål, K. Vet. Akad. Handl. viii. (1) p. 53 (1869).

C. mitratus, Germ. (Lycoderes), Fairm. (Lycoderes) l.c. p. 523. Walk. l.c. p. 632. *C. galerita*, Lep. (Bocydium) Ill. Pl. 56, figs. a–c. Two species. Brazil.

COCCOSTERPHUS, Stål.

C. minutus, Fab. (Centrotus). Stål, l.c. p. 51 (1869). Tranquebar.

COLOBORRHIS, Germ.

C. corticana, Germ. Silb. Rev. Ent. p. 73 (1876). *C. Bohemania*, Stål, l.c. p. 97. *C. perspicillaris*, Germ. Caffraria.

CRYPTASPIDIA, Stål.

C. pubera, Stål. *C. impressa*, Stål, Œfv. Vet. Akad. Förh. 27, p. 729 (1871.) Four species. Philippines.

DAIMON, Buck.

D. satyrus, Buck. l.c. p. 240, Pl. 55, figs. 4–4b.

DAUNUS, Stål.

Stål, Hemip. Afri. IV. p. 87. Œfv. Vet. Akad. Förh. 26, pp. 282, 288. *D. oppugnans*, Walk. (Centrotus) l.c. Suppl. p. 160. *D. tasmaniæ*, Fairm. l.c. p. 513. Nine species. Mexico, Tasmania.

DELAUNEYA, Leth.

D. fasciata, Leth. (1881). Amy. et Servil. l.c. p. 17.

ELAPHICEPS, Buck.

E. cervus, Buck. l.c. p. 216, Pl. 48, figs. 4, 4a.

EMPHUSIS, Buck.

E. tumescens, Buck. l.c. p. 256, Pl. 59, figs. 6–6b.

ENDOIASTUS, Fowl.

E. cavipennis, Fowl. l.c. p. 168, Tab. X. figs. 16, 16a. Guatemala.

IBICIS, Buck.

I. falcatus, Buck. l.c. p. 239, Pl. 54, fig. 6.

GARGARA, Amy. et Serv.

**G. genistæ*, Fab. (Centrotus), Am. & Ser. l.c. p. 520. *G. simplex*, Walk. l.c. Ins Saund. p. 78. Thirty species. Europe, Philippines, Papua.

GERRIDIUS, Fowl.

G. scutellatus, Fowl. l.c. p. 167, Tab. X. figs. 11, 11a. Panama.

GLISCHROCENTRUS, Fowl.

G. cucullatus, Fowl. l.c. p. 161, Tab. X. fig. 5. Panama.

GNAMPTOCENTRUS, Fowl.

G. sinuatus, Fowl. l.c. p. 152. *G. caviformis*, Fowl. l.c. p. 153, Tab. IX. fig. 15. Guatemala.

GONIOLOMUS, Stål.

G. tricorniger, Stål, l.c. p. 294. Cuba.

HYPSAUCHENIA, Germ.

H. ballista, Germ. l.c. 231. *H. hardwickii*, Kirb. (Centrotus). Nepaul.

ISCHNOCENTRUS, Stål, Fowl.

I. niger, Stål, l.c. p. 293. Fowl. l.c. p. 155, Tab. IX. fig. 19. *I. ferruginosus*, Stål, l.c. p. 293. Bogota.

KLEIDOS, Buck.

K. vomeratus, Buck. l.c. p. 214. Pl. 48, figs. 2, 2a.

LAMPROPTERA, Germ.

L. capreolus, Germ. (Centrotus), Silb. Rev. Ent. III. p. 261. *L. vacca*, l c. p. 261. Brazil.

LEPTOCENTRUS, Stål.

**L. bos*, Sign. (Centrotus). *L. bos*, Stål, l.c. p. 90. **L. taurus*, Fab. (Membracis). Nineteen species. India, China, Borneo.

LIRANIA, Stål.

L. bituberculata, Stål, l.c. p. 36. Rio Janeiro.

LOBOCENTRUS, Stål.

L. zonatus, Stål, l.c. p. 728. Philippines.

LOPHUCHA, Stål.

L. lobata, Stål (Lycoderes), l.c. p. 34. *L. gaffa*, Fairm. (Lycoderes), l.c. p. 524. Rio Janeiro.

LOPHYRASPIS, Stål.

L. pygmæa, Fab. (Tettigonia), Stål, l.c. p. 55. S. America.

LYCODERES, Germar, and Amy. et Serv.

L. ancora, Germ. (Centrotus) (Bocydium) Perty. *L. Burmeisterii*, Fairm. l.c. p. 525. Eight species Brazil.

MACHÆROTYPUS, Uhler.

M. sellatus, Proc. U. S. Mus. XIX. p. 284. (1896).

MEGALOSCHEMA, Buck.

M. laticornis, Buck. l.c. p. 52, Pl. LII. fig. 2.

MICREUNE, Walk.

M. formidenda, Walk. l.c. p. 164, Jour. Linn. Soc. p. 94. *M. gazella*, Fairm. (Centrotus) l.c. p. 520. Sarawak.

MICROCENTRUS, Stål.

M. caryæ, Fitch (Uroxiphus c.) Rep. Nat. Hist. Mus. Albany, p. 52 (1852). Stål, l.c. p. 295. New York.

MINA, Walk.

**M. aliena*, Walk. l.c. p. 165. (1852, Suppl.) Ega.

MŒROPS, Buck.

M. mixta, Buck. l.c. p. 257, Pl. 59, figs. 8, 8a.

MONOBELUS, Stål.

M. fasciatus, Fab. (Membracis), Stål, l.c. p. 48. *M. flavidus*, Fairm. (Centrotus), l.c. p. 519 Cuba.

MULTARSIS, Goding.

M. cornutus, God. Canad. Ent. p. 274 (1895). California.

NARNIA, Walk.

N. rostrata, Walk. l.c. pp. 193, 285 (1860), Jour. Linn. Soc.

NESSORHINUS, Amy. et Serv.

N. vulpes, Amy. et Serv. p. 542.

NICONIA, Stål.

N. lemniscata, l.c. p. 249. Rio Janeiro.

ŒDA, Amy. et Serv.

Œ. inflata, Amy. et Serv. Hemip. p. 546 (Membracis) Fab. Perty Del An 178.

OPHICENTRUS, Fowl.

O. notandus, Fowl. l.c. p. 156, Tab. IX. figs. 20, 20a.

ORTHOBELUS, Stål.

**O. urus*, Fairm. (Centrotus) l.c. p. 516, Pl. 3, fig. 6. Stål, l.c. p. 48. Sierra Leone.

OTARIS, Buck.

O. auritus, Buck. l.c. p. 249, Pl. 59, fig. I.

OTINOTUS, Buck.

O. belus, Buck. l.c. p. 232, Pl. 52, figs. 3, 3a. *O. pallipes.*

OXYRHACHIS, Germ.

O. tarandus, Fab. (Membracis) Germ. l.c. p. 232. *O. delalandii*, Fairm. l.c. p 268.

PEDALION, Buck.

P. ornatum, Buck. l.c. p. 252, Pl. 57, figs. 6, 6a. *P. ornatum*, Buck.

PHAULOCENTRUS, Fowl.

P. pileatus, Fowl. l.c. p. 159, Tab. X. figs. 1, 1a.

PHÆRONOTUS, Buck.

S. stipulipennis, Buck. l.c. p. 255, Pl. 59, fig. 3.

PLATYBELUS, Stål.

P. flavus, Sign. (Centrotus), Stål, l.c. p. 96. *P. nodicornis* (Centrotus, Germ.) Fairm. l.c. p. 511. Pl. III. fig. 13. P. *senegalensis*, Stål, l.c. p. 97. Six species. Celebes, Natal, Senegal, Madagascar.

PLATYCENTRUS, Stål.

P. denticornis, Stål, l.c. p. 291. *P. obtusicornis*, Stål, Fowl. l.c. p. 149, Tab. IX. fig. 11.

POGON, Buck.

P. incurvum, Buck. l.c. p. 248, Pl. 15, figs. 6, 6a.

POLOCENTRUS, Buck.

P. latipes, Buck. l.c. p. 253, Pl. 58. *P. rufus*, p. 254.

PSILOCENTRUS, Fowl.

P. rufotestaceus, Fowl. l.c. p. 157, Tab. IX. fig. 22.

PTEROSTICTA, Buck

P. rubrilinea, Buck. l.c. p. 230, Pl. 51, fig. 4.

PYRAMBA, Buck.

C. aurifacies, Mon. Membrac. p. 248, Pl. 58, figs. 5, 5b.

PYRGONATA, Stål.

P. bifoliata, Westw. (Smilia), Hypsauchenia, Walk. l.c. p. 631. *P. tumida*, Stål, l.c. p. 731. Five species. Philippines.

RABDUCHUS, Buck.

R. gnomon, Buck. l.c. p. 251, Pl. 57, fig. 4.

RHYPAROPTERA, Stål.

R. emarginata, Fab. (Membracis) (Lycoderes), Stål, l.c. p. 53. *R. luctans*, Stål (Lycoderes), l.c. p. 35.

SARANTUS, Stål.

S. Wallacei, Stål, p. 392, Trans. Ent. Soc. Lond.

SCYTODEPSA, Stål.

S. exiguus, Stål, l.c. p. 47 (Fab. Centrotus). South America.

SEXTIUS, Stål.

S. bipunctata, Stål, l.c. p. 52. *S. cupræus*, Kirb. (Centrotus), Jour. Linn. Soc. 24, p. 168. *S. virescens* (Centrotus), Amy. et Serv. Ins. Hemip. p. 515. Australia. Fourteen species.

SIPYLUS, Stål.

S. crassulus, Stål, l.c. p. 285. Java.

SMERDALEA, Fowl.

S. horrescens, Fowl. l.c. p. 163, Tab. X. figs. 7–7b. Guatemala.

SPATHOCENTRUS, Fowl.

S. intermedius, Fowl. l.c. p. 153, Tab. IX. figs. 16, 16a.

SPHÆROCENTRUS, Fowl.

S. curvidens, Fowl. l.c. p. 154, Tab. IX. fig. 17. *Centrotus curvidens*, Fairm. l.c. p. 519.

STEGASPIS, Germ.

**S. fronditia*, Linn. (Cicada), De Geer, Stoll, Burm. Stål. Fairm. l.c. p. 526 (Lycoderes). *S. latipennis*, Walk. (Centrotus) l.c. p. 607.

STICTODEPSA, Stål.

S. fasciata, Stål, Fab. (Cicada), l.c. p. 68.

STYLOCENTRUS, Stål.

Stål, Kongl. Sv. Vet. Akad. Handl. Band VIII. p. 49. Fowl. *S. Championi*, l.c. p. 164, Tab. X. fig. 8 (? Bocydium). Panama.

TAURION, Buck.

T. obesum, Buck. l.c. p. 259, Pl. 60, fig. 6.

TERENTIUS, Stål.

T. fairmarei, Stål (Centrotus), l.c. p. 284 (1858).

TETRAPLATYS, Walk.

T. atomarius, l.c. p. 510 (1851). S. America.

TRICHOCEPS, Buck.

T. brunneipennis, Buck. l.c. p. 249, Pl. 56, fig. 8.

TROPIDASPIS, Stl.

T. carinata, Stål, Fab. (Centrotus), Vet. Akad. Handl. 8, p. 56 (1869).

TOLANIA, Stål, Fowl.

**T. opponens*, Walk. (Centrotus) l.c. Suppl. p. 159. *T. obtusa*, Fowl. l.c. p. 166, Tab. X. fig. 14. Nine species. Guatemala.

TUBERCULOCENTRUS, Goding.

T. solus, Goding, Canad. Ent. 27, p. 275. California.

UROXIPHUS, Am. & Serv.

U. maculiscutum, Am. & Serv. l.c. p. 550, Pl. 12. Senegal.

XIPHISTES, Stål.

X. fuscicornis, Germ. (Oxyrhachis) l.c. p. 232. Stål, Hemip. Afri. IV. p. 85.

XIPHOPŒUS, Stål.

X. phantasma, Sign. Stål, Hemip. Afr. IV. pp. 87 and 91. Five species. Celebes.

N.B.—It has been before noted that the sub-family Centrotidæ in several respects is undefined in its characters as regard the scutellum and the posterior horn, which last appendage in fact sometimes appears to be almost cephalic. On this account, I have excluded certain genera from the Centrotidæ and partly so from their general distribution over the Old World. These genera are Lycoderes, Bocydium, Hypsauchenia, Micreune, Œda, Nessorhinus, Anchon, Kleidos and Elaphiceps, though authors have comprised some of these in the group.

In the above abridged list these genera are, however, included in the Centrotidæ, and thus they occur twice over.

SUGGESTIONS AS TO THE MEANING OF THE SHAPES AND COLOURS OF THE MEMBRACIDÆ, IN THE STRUGGLE FOR EXISTENCE

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In studying the meaning and use of insect colour and form it is deeply interesting to compare broadly the two great divisions of the RHYNCHOTA. The HETEROPTERA (HEMIPTERA) are obviously, as a whole, a specially protected group, commonly defended by taste or smell from large numbers of insect-eating animals. Warning or aposematic colours and patterns abound among them, while their movements are such as to promote the conspicuous effect of strongly contrasted tints. Groups of species in the same locality often possess similar aposematic colours, thus enabling their young and inexperienced enemies to learn and remember the appearance of unpalatable forms, with a comparatively small waste of life. Such resemblances are often spoken of as Müllerian Mimicry, after the naturalist who first suggested the benefits which arise from facilitating the education of foes. They may also be called by the more descriptive title "Common Warning," or "Synaposematic" colours. For it is clear that in such cases we have to do with the useful possession of warning colours in common rather than with the benefits conferred by "Protective Mimicry" (Pseudaposematic colours) as defined by H. W. Bates. By these latter resemblances a rare, much persecuted, palatable form is believed to be mistaken by enemies for an abundant species, well known and avoided because of some special mode of defence. Good examples of S. African HETEROPTERA with common warning colours have recently been described and figured by Mr. Guy A. K. Marshall (*Trans. Ent. Soc. Lond.*, 1902, p. 537).

When we find the HETEROPTERA resembling specially protected insects of other Orders, such as the conspicuous distasteful groups of Coleoptera: the *Lycidæ* (l.c. p. 515), the *Cantharidæ* (p. 518), the *Coccinellidæ* (p. 520), or the aggressive

HYMENOPTERA (p. 535), the question at once arises as to whether the likeness is to be explained by the theory of H. W. Bates or by that of Fritz Müller. The evidence for the existence of a widespread distastefulness among the HETEROPTERA strongly suggests the latter interpretation rather than the former. It is hardly necessary to remark that there are numerous exceptions to these broad statements. Beautiful examples of cryptic defence are well known in the HETEROPTERA even of this country. Nevertheless the group, as a whole, is characterised by the abundance and conspicuousness of aposematic and synaposematic combinations of colours, the resemblances to insects outside the group falling probably into this latter category.

The RHYNCHOTA HOMOPTERA are sharply contrasted with the HETEROPTERA, cryptic colours and patterns being relatively common among them, although some of the divisions are very conspicuous and probably aposematic. When resemblances to other insects occur they are probably to be explained as Batesian (Pseudaposematic = Protective) Mimicry, when the most nearly allied non-mimetic species of HOMOPTERA possess a cryptic defence (Protective Resemblance), as Müllerian (Synaposematic = Common Warning Colours) when the allied species are conspicuous with aposematic or warning colours.

Allusion must be made to the special and curious defence by a waxy secretion which is common in the HOMOPTERA. The method may be compared to the defensive silken walls of the cocoon in other insects, while the long trailing filaments of wax borne by certain species of HOMOPTERA may play the same part as the "tails" on the hind wings of many LEPIDOPTERA, or the "tussocks" of hair on some of their larvæ—all these probably acting as directive structures which divert the attention of an enemy from the vital parts.

The deeply interesting section of the HOMOPTERA which forms the subject of the present memoir has an important bearing upon the bionomics of insect colouring, affording as it seems to the present writer, one of the most convincing of all the arguments which have been adduced in support of an interpretation based upon the theory of natural selection.

The *Membracidæ*, as a whole, appear to depend chiefly upon Protective Resemblance, concealment being effected by likeness to various vegetable structures. Examples of resemblance to other insects—ants, beetles, &c.—are found in many species, but the interpretation of these as Batesian or Müllerian is better considered after the examples themselves have been dealt with.

Resemblances to other insects and to the vegetable environment are, of course, extremely common throughout the Insecta, but nowhere (except in a few ORTHOPTERA) are they produced in the same manner as in the *Membracidæ*. The deceptive disguise of other insects is manifest in various parts of the body, and often in many parts together: in the *Membracidæ* the disguise is chiefly borne and often solely borne by the pronotum alone. The marked resemblance to ants in the genus *Heteronotus*, the strange and remarkable shapes which we should probably recognise as cryptic if we saw the living insects in their natural environment—these are borne by a mask which is a development from a relatively small part of the organism. The Membracid, as a whole, bears not the slightest resemblance to ant or thorn or bark, but it is covered by a shield which does bear a striking resemblance in some species to the first, in others to the second, in others again to the third, of these objects.

Those who oppose the interpretation based on natural selection are therefore faced by the question—how, except by selection, can it be conceived that the variations of shape in the pronotal shield of an insect can have been guided into the superficial resemblance to an ant, while variations in the whole body-form of another have assumed the same appearance, while in a third the likeness is indicated by colour alone, resulting in the invisibility of those parts which would interfere with the resemblance? The attainment of the same end by entirely different means affords strong support to the opinion that the end is advantageous. On any other hypothesis as yet put forward it is a meaningless coincidence that the model suggested in each of these three different ways, is the same specially aggressive and well-known insect. This argument was first suggested by the present writer at the Toronto meeting of the British Association in 1897 (Report of the Meeting, page 692) and was further developed with the aid of illustrations in the *Journal of the Linnean Society* (Zoology, Vol. XXVI., pp. 588–595).

In the following pages I have employed the word "mimicry" to indicate resemblances to other species of animals. Likeness to plant structures, &c., for the purpose of concealment I have invariably called "cryptic" or "protective resemblance." Among the *Membracidæ* such concealment is always "procryptic," for the purpose of defence; although anticryptic or aggressive resemblances to plants are well known in insects, especially in the flower- and leaf-like mantides (see page 153).

In discussing the effect of hereditary bias towards particular colouring (see page 200) I was considering only the cases of insects in which each individual possesses a power of special adjustment to two or more of its possible environments. For example the larvæ of the moth *Amphidasis betularia* have the power of becoming black on a plant with black twigs, green when the twigs are green, white when they are glaucous, &c. (*Trans. Ent. Soc. Lond.*, 1892, pp. 326–360). This individual adaptability and freedom from bias is clearly advantageous. If, for example, the effect of green shoots persisted in the next generation it would be injurious to the great majority of the larvæ, for the parent moth generally lays her eggs on plants with dark twigs. The same argument applies to the smaller differences which distinguish the dark twigs of various trees from each other; for these also are reproduced upon the larvæ. Thus Mr. Arthur Sidgwick has shown that the caterpillars, when found upon birch and oak, differ, as do the dark twigs of these two trees (l.c. p. 360). It has not yet been shown that any Membracid has this power of adjusting its colour to two or more environments, so that my argument does not at present apply to these insects. If, however, it is at all possible to breed them it would be deeply interesting to ascertain whether any such adaptability exists. The best chance of success would be afforded by experiments upon well-concealed species of which the individuals are known to vary greatly, but always in the direction of some one of their natural environments.

It is now proposed to make a brief survey of the material illustrated in this monograph and to attempt to suggest the possible bionomic meaning of the appearances into which the enveloping pronotal shield is fashioned in the various groups of species.

Commencing with the sub-family *Membracinæ*, the genus *Membracis* includes the species with the pronotum high and compressed from side to side, and coming to a sharp thin edge like a leaf. Beneath this leaf-shaped structure, which is dark, mottled with white or yellow, the head, wings, and legs of the insect are seen (see Plates I. and II.). Inhabiting the same part of the world, tropical America, in which alone this genus is found, are ants of the genus *Œcodoma* (Sauba ants). The ants live upon fungi which they cultivate in galleries underground, growing them upon a paste of bitten-up leaves. To provide this soil streams of ants are continually passing to the formicarium, each bearing a piece of leaf held vertically in its mandibles and thrown back over the body. The ants are extremely common, so much so indeed that certain kinds of imported trees cannot live in that part of the world, and the processions of leaf-carriers as well as the single ants are among the most familiar and characteristic of sights. The *Membracidæ* on the other hand are scarce. Green leaves are not the only things sought out by the ants; they have been seen carrying off parts of the wings of butterflies, as well as leaves discoloured in various ways.

It seems possible that the rare *Membracis* with its high laminar pronotum may pass undetected among the numerous leaf-carrying ants which are partially concealed beneath their burdens in much the same manner. Furthermore the pronotum is about the same size as the fragment of leaf and the Membracid as some of the forms of the worker ants.

I do not desire to press this interpretation with confidence, but merely bring it forward as a suggestion. I venture to hope that naturalists visiting tropical America will observe whether the leaves carried by the ants do not sometimes possess the curious parti-coloured appearance of the Membracid pronotum.

The larvæ (Plate II. Fig. 4*a*) of the species of this genus are described by Canon Fowler in the *Biologia Centrali-Americana* as "very curious, being of much the same shape as the perfect insect, but formed of separate upright narrow plates of different heights." That these larvæ protectively mimic the leaf-carrying ants is highly probable, far more so than in the case of the mature insects; for we have here the testimony of a biologist who observed the living insect in its natural habitat. Mr. W. L. Sclater, on returning from his journey to British Guiana in 1886, told me that on one occasion while collecting insects by shaking the branches of a tree over a sheet, his native servant, whom he described as a very acute observer, mistook one of these Membracid larvæ for a "Cooshie ant" carrying its fragment of leaf. Mr. Sclater brought the larva home, and it is figured in a short paper communicated to the Zoological Society (P.Z.S. 1891, p. 462, Plate XXXVI.). In this case we know that the thin flattened body is of a green colour like a leaf, while beneath it the legs and head are brown like the part of the ant which is not concealed by the leaf.

It is of great interest that the remarkable forms of larva and perfect insect—although superficially alike—are produced in entirely different ways. In the larva the thin flattened shape is due to compression of the whole of the body rings behind the head, and every one of them contributes to form the sharp dorsal line which so much resembles the serrated margin of a leaf or a jagged edge gnawed by the mandibles of the ant. The same sharp line, forming a smoother sweep, is, in the perfect insect, made up by the edge of the pronotum alone. If, therefore, both larva and imago resemble leaf-carrying ants, the part representing the leaf is made up by all the segments in the one, and by the pronotum alone in the other. Both larvæ and imagos probably live in the trees which the ants frequent for the purpose of cutting the leaves.

At first sight it seems very difficult to account for the origin of such a case of protective mimicry, if indeed the interpretation here suggested be correct. It is, however, probable that the thin green body-form was gradually evolved to promote concealment among leaves, and that the few special details which suggest the ant were subsequently added.

It is also of much interest that forms superficially resembling *Membracis* should be found in the Orthopterous genus *Xerophyllum* (Plate I.) where the dead-leaf-like appearance is not confined to the pronotum but is further carried out in the legs and head. The resemblance is clearly incidental and syncryptic.

The appearance of the genera *Phyllotropis* and *Cryptonotus* (Plates III. and IV.) is not unlike that of *Membracis*. In the genera *Enchophyllum* and *Enchenopa* (Plates IV. to VI.) the pronotum is prolonged into a horn anteriorly, in some species bent, and in others straight. The shape and appearance probably promote concealment in trees and shrubs. *Tropidocyta* and *Leioscyta* (Plate VII.) are very similar to the above-named genera, but the pronotum is not foliaceous and is rounded or very obtusely pointed anteriorly. They are probably adapted to concealment among plants, resembling buds or the irregularities of rough bark.

The irregular rounded species of the genus *Tylopelta* (Plate VII.) would also be well concealed on rough bark, while on the ground they would resemble seeds, the excrement of larvæ, or small lumps of earth. Some of the elongated and generally curved forms of *Philya* and *Scalmophorus* (Plate VIII.) suggest small bits of stick, of which the projecting end appears to be broken off, while the species in which the pronotal horn is pointed anteriorly perhaps represent thorns. The greatly varied shapes presented by the genus *Hypsoprora* (Plates VIII. and IX.) suggest protective resemblance to vegetable growths of various kinds—buds, roughened bark, irregular or winged seeds.

The next genus, *Bolbonota* (Plates IX. and X.), contains small, dark, roundish insects closely resembling seeds, also small lumps of earth, &c. They would be well concealed upon rough bark. The pronotum, which is the only part seen when the insect is looked at from above, is rounded and broad and its surface deeply sculptured. In the position of rest the legs are folded close to the body, and thus help in the disguise. Canon Fowler remarks in the Biologia: "No insect could look more unlike the foliaceous species of *Membracis*, and yet, so gradual and so complete is the transition through intermediate species, that the older authors included them under the same genus." *Bolbonotodes* (Plate X., Fig. 9) includes an allied insect, which is also seed-like in appearance.

Pterygia, with its remarkable winged processes and strongly roughened surfaces (Plates XI.–XIII.), appears to be undoubtedly cryptic, resembling some of the forms of the vegetable environment. What these exact forms are must be determined by naturalists upon the spot, but lichen, winged seeds, and the irregularities of extremely rough bark may be suggested. Almost the same words may be used of the astonishing forms presented by the remarkable genus *Sphongophorus* (Plates XIII.–XV.), some of which seem clearly to suggest lichen, and others the excrement of birds or other animals, as is indicated by Mr. Buckton (see description of Fig. 4 on Plate XIV). A possible resemblance to galls should also be taken into account. The remarkable inflated part of the pronotum of *Sphongophorus inflatus*, figured by Canon Fowler on Plate III., Fig. 5, of his monograph in the Biologia, bears a peculiar sculpture which may be gall-like. The species are, as Canon Fowler writes in the Biologia, "among the most extraordinary of the *Membracidæ*, and, in fact, there are few insects which assume more curious forms."

I can imagine no more interesting study for the tropical American naturalist than the attempt to discover the meaning of these remarkable shapes by careful observation of the living insects under as many different conditions as possible, and especially during the periods of prolonged rest and entire quiescence. It is during these latter times rather than in periods of activity (including the frequently repeated brief intervening pauses) that the true meaning of a cryptic appearance and instinct is to be sought. Thus insects which are about by day should be watched going to rest, and then observed from time to time during the hours of darkness; conversely, nocturnal forms should be tracked and then watched by day. Insects which require the hottest sunshine should be studied in exceptionally cold cloudy weather, &c. In thus looking out for the times of complete repose, when a cryptic appearance is of the highest importance, Mr. Nelson Annandale's observations in Malacca (1899–1900) should be remembered. He informs me that insect-eating animals retire to rest during the hottest hours of the day, and that at this very time insects, including such cryptic forms as the stick-like Phasmids, move about freely, assume positions and occupy environments in which they are quite conspicuous. Any observer who neglects to take account of this aspect of the question can only commit himself to random criticism like that which has been often urged against the interpretation of the wonderfully cryptic underside of butterflies of the genus *Kallima.* Because these insects have been seen in conspicuous positions and attitudes during the short pauses between successive flights it has been argued that the dead-leaf-like underside cannot be for concealment. Let any such observer watch a *Kallima* to rest at the close of a day's active flight, and his notes and criticism on the subject will have value. As it is we are only confronted by the aimless objection that an adaptation developed for one purpose is not made use of for another, and with this conclusion the movements and attitudes of our English *Vanessidæ,* with their cryptic undersides, had long ago familiarised us.

We now reach the second sub-family of Mr. Buckton's classification, the *Hoplophorinæ.* The cryptic resemblance to thorns in the genus *Umbonia* (Plates XVI. and XVII.) is well known, but here, too, exact observation of the living insects is much wanted. The manner in which the red stripes are developed on the green or greenish thorn-like pronotum is very realistic and convincing. The fact that the females are far more completely thorn-like than the males (compare Figs. 1, 2, 3 with 4 and 5 on Plate XVI.) may be merely another example of the general principle that the latter sex, when it differs from the former, is more cryptic or more completely mimetic, as the case may be. The greater needs of one sex have been met by increased perfection in those adaptations which are the chief means of defence.

The remaining genera of the *Hoplophorinæ,* figured by Mr. Buckton, viz., *Triquetra,* *Microschema*, *Hoplophora*, *Platycotis*, *Potnia*, and *Ochropepla* (Plates XVIII.-XXII.), also suggest cryptic resemblance to various vegetable structures, as a reference to the figures will sufficiently indicate. As in almost all the other cases the bionomics of each of the species requires special study upon the spot. In *Hoplophora sanguinosa* (Plate XIX., Fig. 3) Mr. Buckton suggests the resemblance to a small bee. A probable model may be found by a search among the Neotropical Hymenoptera Aculeata, but observation of the living insects will still be most desirable in order to afford the fullest confirmation of the interpretation.

In the two sub-families, the *Membracinæ* and the *Hoplophorinæ*, cryptic appearances seem to be almost universal, so far as we can judge from the more or less probable interpretations suggested by a study of cabinet specimens and figures. We now reach the *Darninæ*, a sub-family in which mimetic adaptation is the probable explanation of many species. Passing the genus *Aspona* (Plate XXII.), of which the colouring may be cryptic, we reach the contrasted colours and conspicuous patterns of *Darnis* (Plates XXII. and XXIII.). It is highly probable that the appearances which are here figured, indicate aposematic (warning) colours, or else mimicry of the warning colours of other animals. It is probable that one or more of the unpalatable groups of Coleoptera, such as the Phytophaga or the *Coccinellidæ*, afford the models for some of the species, and it has been suggested that others are mimetic of slugs (see page 109). Certainty can only be attained by a study on the spot, but some conclusions with a high degree of probability could, I think, be reached by an examination of a good museum collection of the specially protected Coleoptera from the same part of the world. Some of the species of the genus *Stictopelta* (Plates XXIII. and XXIV.) are also probably mimetic of Coleoptera. The representation of *S. nigrifrons* (Plate XXIII., Fig. 5) especially suggests the appearance of a beetle, such as one of the Phytophaga, with a reddish head, black thorax, and light brown elytra. Other species of this genus possess colours which may be cryptic, and the same is the case with *Hebeticoides*, *Hebetica*, *Tropidarnis*, *Alcmeone*, *Hyphinoë*, *Darnoides*, *Dysyncritus*, *Aconophora*, *Entaphius*, *Hypheus*, *Hemiptycha*, *Nessorrhinus*, and *Cymbomorpha* (Plates XXIII.–XXIX.). The cryptic interpretation is highly probable in some of the species figured, less certain in others. Thus Mr. Buckton's suggestion that *Hebeticoides acutus* (Plate XXIII., Fig. 8) resembles a shining brown seed (page 119), or, at least, some vegetable structure, is in every way probable, as is the bud-, thorn-, or spine-like interpretation of several species of *Aconophora*. A single figured species of this latter genus, *A. W—album* (Plate XXVIII., Fig. 5), appears to possess an aposematic or mimetic colouring. Again, the species of *Alcmeone*, *A. centrotoides*, shown on Plate XXIV., Fig. 6, appears to be cryptic, while *A. godmani*, figured by Canon Fowler on Plate V., Fig. 24, of his monograph in the

Biologia, is justly described by Mr. Buckton as "one of the most conspicuous amongst the *Membracidæ*" (p. 111). The figure strongly suggests warning or mimetic colouration, but a possible cryptic resemblance to a brilliant fungus, fruit, or flower-bud, should not be left out of account in the search for an interpretation.

In *Heteronotus* (Plate XXX.) the resemblance of the pronotal shield to an ant has already been noted. The relation of the ant-like mask to the insect as a whole is well seen in the various figures of Plate XXX. Thus, the dorsal view shows only the mask with wings and legs and part of the head (Figs. 2 and 6a). The lateral view shows no more when the wings and tegmina are somewhat opaque, and are represented in the position which is probably natural during rest (Figs. 1, 3, 4). When they are more transparent, as in Fig. 6, the abdomen may be seen through them, but it is probable that in the natural attitude this part of the body would be raised, and thus, at least, partially hidden by the underside of the mask. When, in a drawing of the side-view, the wings are represented as raised (Figs. 2a and 5), or when the insect is drawn from below (Fig. 4a), the true relationship of mask and insect proper is seen, and the entirely Homopterous character of the insect, as a whole, in spite of its Hymenopteron-like shield, will be at once appreciated. In *Heteronotus trinodosus*, figured in Canon Fowler's monograph in the Biologia Centrali-Americana (Plate VI., Figs. 16, 16a, and 17), a bead-like dilatation is present in the part of the shield which represents the peduncle or stalk connecting the thorax and abdomen of an ant. This structure is evidently in mimetic resemblance of the bead-like enlargement of the peduncle in the *Myrmicidæ*, the family of stinging ants which are specially characteristic of South America. This interesting detail in the likeness between model and mimic was pointed out to me by Mr. W. F. H. Blandford. Mr. Buckton considers that some of the species of this genus mimic striped spiders. If this be the case the resemblance would probably be to spiders which are themselves mimetic of ants, as are many of the *Attidæ*. Observation upon the spot is, above all, necessary in order to settle the question ; but should it hereafter be decided in the affirmative, another example would probably be added to the many known instances of that secondary likeness between the mimics of some primary model which appears to be a sure indication of Müllerian (synaposematic) resemblance (*Trans. Ent. Soc. Lond.*, 1902, pp. 511–515). Another interesting subject which must be studied upon the spot is the investigation of the movements and habits of the mimetic *Membracidæ*, and especially these ant-like forms. Mimics of ants are, as a rule, markedly ant-like in their movements, and we should expect this to be the case with the *Membracidæ*, but so far as I am aware no special observations have been made upon them.

The concluding genus *Combophora*, and sub-genus *Anchistrotus*, of the *Darninæ* seem also to be mimetic, as a glance at Plates XXXI. and XXXII. will suggest. The model of *Combophora beskii* (Plate XXXI., Figs. 1 and 2) appears to be a *Coccinella* or a *Coccinella*-like beetle. But the pattern is so strongly developed and conspicuous as to raise the suspicion of independent unpalatability and Müllerian association. The simple effective Coccinelloid type of pattern and colouring is probably easily reached by variation and selection, and is certainly prone to attract specially protected forms of the most varied affinities into synaposematic groups (see *Trans. Ent. Soc. Lond.*, 1902, p. 520, and P.Z.S. 1902, pp. 268, 270). Another very conspicuous species of the genus *Combophora*, viz., *C. tridensis*, is also represented (Plate XXXI., Figs. 5, 5a). The appearance, together with that of the form of *C. beskii*, shown in Fig. 2, suggests an example of warning colours or mimicry, and the same interpretation probably holds for the other types of colouration represented in Plate XXXI.—the species of *Combophora*, shown in Figures 3, 6, and 7, and *Anchistrotus obesus*, seen in Fig. 4. As regards the latter the white patch on the dark tegmina seems especially suggestive of mimicry or warning colours.

Looking back on the *Darninæ* we are led to believe that at least much of the mimicry in the group is Müllerian rather than Batesian, because of the tendency of the resemblances to appear throughout whole genera, and because the colours and patterns of many species have a marked conspicuousness of their own.

The small fourth sub-family, the *Tragopinæ*, is illustrated on Plates XXXII. and XXXIII. by the genera *Tragopa*, *Chelyoidea*, and *Horiola*. The group is probably mimetic, as Mr. Buckton suggests on p. 155 ; but the conspicuous distasteful groups among the Neotropical Rhynchota, as well as Coleoptera, should be investigated for probable models. The shapes shown in Plate XXXII., Figs. 8 and 9, and Plate XXXIII., Figs. 1a and 2, seem especially likely to resemble those of other distasteful Rhynchota. Here too the Müllerian interpretation seems the more probable.

The fifth sub-family, the *Smiliinæ*, is a very large one. The most remarkable of all the species of this remarkable section of the Homoptera are to be found here in *Cyphonia*, and in the genera *Bocydium* and *Œda*, placed by Mr. Buckton between the *Smiliinæ* and the *Centrotidæ*.

The remarkable combination of filaments and dilated spheres developed by the pronotum in certain species of the genus *Cyphonia* (Plate XXXIII., Figs. 4, 5, 6, 7, and 7a), may be compared with the still more extraordinary and complex structures in *Bocydium* (Plate XLV., Figs. 6, 7, and 8 ; Plate XLVI., Figs. 1, 2, and 2a). In the absence of observations on the spot, the most probable interpretation is to suppose a cryptic resemblance to some vegetable structure, such as a spined fruit or seed specially adapted for anchorage in the fur of animals ; or some complex development of thorn or spine. When we consider how far the Neotropical Region surpasses the rest of the world in the amount and variety of mimetic resemblance in insects we see the outcome of a selective environment which may well have developed cryptic forms more strange and complex than any that are known elsewhere. But the possibility of mimetic likeness in *Cyphonia* and *Bocydium* should not be left out of account in the attempt to solve the problem. The fact that no undoubted explanation is forthcoming is by no means surprising; and even when the living insects are studied under natural conditions it is quite likely that a solution may be long delayed. Every English entomologist has known from boyhood the "Comma" or "C" on the underside of the wings of the butterfly *Grapta C-album;* yet the explanation of a cryptic resemblance to the light seen through a semicircular crack in a weather-beaten fragment of dead leaf, although sufficiently obvious when once stated, was only given a few weeks ago (*Proc. Ent. Soc. Lond.* for May 6, 1903). The writer hopes that Mr. Buckton's figures of species of these two genera may induce naturalists in South America to make a special effort to solve this deeply interesting problem. The observer should keep a very open mind and not neglect effects produced by communities of individuals of the same species, nor the possibility that a single Membracid surmounted by the branching appendages of its pronotum may resemble a combination of two quite different forms, such as an ant or spider attacking or carrying its insect prey. Figs. 4, 5, 6, and 7 on Plate XXXIII., and 1a on Plate XXXIV., should be looked at from this point of view.

Passing to other genera, *Poppea* (Plate XXXIV.) presents structures similar to *Cyphonia*, but on a somewhat smaller scale. In *Ceresa*, *Stictocephala*, *Centrogonia*, *Phacusa*, *Eurytea*, *Acutalis*, *Micrutalis*, *Trachytalis*, and *Polyglypta* (Plates XXXV.–XXXVIII.) we meet with shapes and colours, which generally appear to be explicable without difficulty as examples of protective (cryptic) resemblance to common plant structures. Species of the last-named genus (Plate XXXVIII.) appear to resemble elongated fruits or seeds, although the idea of mimicry of a Brenthid beetle should be tested by observation before being dismissed. *Entylia*, *Publilia*, *Metheisa*, and *Oxygonia* (Plates XXXIX. and XL.) are probably to be explained in the same way, in some cases resembling roughened bark or irregular fruits or seeds, in others perhaps buds.

Parantonaë dipteroides (W. W. Fowler), figured by Canon Fowler on Plate VII., Figs. 10 and 10*a*, of his monograph in the Biologia, is apparently a beautiful mimic, and the aculeate HYMENOPTERA of its sub-region (Central America) should be examined for possible models. Figured with wings outspread the superficial resemblance to a fly is undoubtedly strong, but the effect upon the contour of the dark coloured basal half of the depressed tegmina must be taken into account. Canon Fowler in stating (p. 102) that the species "has the appearance of a *large* fly" (italics mine), seems to have been influenced by the magnified representation on Plate VII.

In *Adippe*, and perhaps *Argante* (Plates XL. and XLI.), mimetic resemblances or warning colours are again suggested, the most probable models being the conspicuous unpalatable groups of Coleoptera. As in so many other cases the extreme conspicuousness suggests the Müllerian rather than Batesian form of mimicry. Protective resemblance to plant structures of various kinds appears to be the interpretation of nearly the whole of the next set of genera, some of which had been also illustrated in earlier plates: *Godingia*, *Antianthe*, *Cyrtolobus*, *Hille*, *Thelia*, *Publilia*, *Atymna*, *Stictocephala*, *Telamona*, and *Heliria* (Plates XLI.–XLIII.). *Gibbomorpha* (Plates XLI. and XLII.) however appears to be more conspicuous and may be aposematic or mimetic. Some of the species of *Telamona*, figured on Plate XLIII., viz., *T. sinuata*, *albidorsata*, and *turritella*, also possess a remarkable colouring which requires investigation in the natural surroundings.

The genera next represented in the plates are those considered as introductory to the *Centrotidæ* proper (p. 205). *Lycoderes* (Plates XLIII.–XLV. and XLVII.) includes species some of which (XLIII. 8; XLIV. 5, 6; XLV. 1, 2) are probably concealed by resemblance to plant structures, while others appear to possess warning or mimetic colours (XLIV. 1, 2, 3; XLVII. 4). *L. burmeisteri* may be mimetic of some other conspicuous distasteful Homopterous insect, such as a Fulgorid. In the remarkable genus *Œda* (Plate XLV.), the pronotum forms a huge inflated sac, the orange-coloured walls of which are transparent and marked with lines due to the existence of a branching network. Mr. Buckton considers this appearance to be leaf-like (p. 205); but it is more probably a case of protective resemblance to the curious cocoons of certain Neotropical moths, which are constructed of an open network of coarse silken strands of an orange colour. The colour of *Œda inflata*, as shown in Plate XLV., Fig. 4, is too dark and opaque to indicate this resemblance. It is, however, sufficiently clear in Erich Haase's, Plate XIII., Figs. 112 and 113 (English translation "Researches on Mimicry," &c., Pt. II., Stuttgart, 1896). Haase himself considered that the insect resembles the empty pupal shell of a butterfly. The entire passage from the original work (Stuttgart, 1893) is as follows: "Ein anderer anscheinender Grenzfall gehört dagegen sicher in die Kategorie der 'Schützenden Aehnlichkeit.' Derselbe betrifft eine merkwürdige neotropische Buckelzirpe *Smilia* (*Oeda*) *inflata*, F., deren Nackenschild von blasigen Hohlräumen durchzogen ist und den winzigen Körper von oben vollkommen verdeckt. So gleicht das auf einem Blatte oder an einem Zweige meist ruhig sitzende Thier durchaus der leeren Puppenhülse eines bereits ausgeschlüpften Tagfalters." The English translation, by M. C. Child, is as follows: "Another apparently transitional case belongs in reality to the category of 'protective resemblance.' This is the case of a peculiar Membracid, *Smilia* (*Œda*) *inflata*, F., whose pronotum is traversed by sac-like hollow spaces, and completely conceals the tiny body when seen from above. Thus, this insect, which usually sits quietly on a leaf or twig, resembles very closely the empty pupal case of a butterfly."

Passing the astonishing genus *Bocydium*, which has been already discussed on pp. 282, 283, we reach the remarkable genera *Hypsauchenia*, *Micreune*, *Anchon*, *Kleidos*, and *Elaphiceps* (Plates XLVI.–XLIX.). The extraordinary developments of the pronotum in these genera, together with its less specialised form in *Lamproptera* (XLVII., 5), probably serve to conceal the insects by their resemblance to vegetable structures.

The *Centrotidæ* are also abundantly illustrated in this monograph, no less than thirty-four genera being represented by figures, and often many figures, upon the concluding series of plates (XLIX.–LX.). It is not necessary to say much about them, for a glance at the plates will indicate that the forms and colours are in almost all cases such as we should expect to resemble plant structures. There are a few possible exceptions, such as the very dark-coloured species of *Centrotypus*, *Daimon*, and *Ibiceps* (Plates LIV., LV.), in some of which the conspicuousness is further heightened by the contrast with pale markings. But it is impossible to feel confident that some, or even all, of them may not be concealed by resemblance to some special form of environment.

In conclusion, I desire again to call attention to the fact that with few exceptions the foregoing remarks are merely suggestions intended to serve as indications to the naturalist on the spot, and are in no sense dogmatic utterances. I feel that in this most remarkable group of insects the examination of figures, or even of the specimens themselves in a museum, can only occasionally afford us the foundation for a valuable opinion as to the bionomic meaning of the forms, colours, and patterns. But such an examination continually suggests possible interpretations which may lead the observer of the living species to think, and may sometimes even direct him into the right track. It was in the hope that such success might be achieved from time to time that I was glad to accept Mr. Buckton's courteous invitation to contribute this section to his interesting monograph.

EDWARD B. POULTON.

OXFORD, *June* 27, 1903.

ADDENDA ET CORRIGENDA.

PAGE

29, line 3, *for* " Fabrinus " *read* " Fabricius."

31, top line, *for* " Cortices " *read* " Corticis."

39, line 3 from bottom, *for* " Birchell " *read* " Burchell."

42, top line, *for* " provitata " *read* " provittata."

43, line 14 from bottom, *for* " Cryptonotus " *read* " Cryptonotum."

,, line 11 from bottom, *for* " Cryptonotus militaris " *read* " Cryptonotum militare."

,, line 3 from bottom, *for* " Birchell " *read* " Burchell."

,, foot-note, *for* " crooked " *read* " concealed."

45, line 2, *for* " Mier's " *read* " Miers."

64, line 2 from bottom, *for* " Mier's " *read* " Miers."

75, line 6, *for* " Flavopunctata " *read* " Flavopuncta."

92, line 6 from bottom, *for* " Rossenburg " *read* " Rosenberg."

97, line 11, *for* " naupilius " *read* " nauplius."

98, line 9, *for* " Guyana " *read* " Guiana in Amazons."

119, line 14, *for* " Daninæ " *read* " Darninæ."

134, line 4 from bottom, *insert* " n.s." *after* " Entaphius funebris."

141, line 21, *insert* " n.s." *after* " fowleri."

142, line 6 from bottom, *for* " glanduliger " *read* " glanduligera."

PAGE

145, line 10 from bottom, *for* " colioptera " *read* " coleoptera."

147, line 19, *insert* * *after* " auchistrotus "; *and for* " sub-genus " *read* " genus."

152, line 2, *for* " them " *read* " others."

171, line 19, *for* " Yatacan " *read* " Yucatan."

183, line 5 from bottom, *after* " New York " *insert* " also."

188, line 9 *for* " concinua " *read* " concinna."

189, line 3, *for* " coreaceous " *read* " coriaceous."

193, line 13 from bottom, *for* " Aurivilliurs " *read* " Aurivillius."

194, line 12 from bottom, *for* " Aurivilliers " *read* " Aurivillius."

203, line 13 from bottom, *for* " Stregaspis " *read* " Stegaspis."

209, line 7, *for* " Pernambucco " *read* " Pernambuco."

212, line 22, *for* " Spongophorus " *read* " Sphongophorus."

225, line 3, *for* " caused by the fracture and escape " *read* " fractured by the escape."

227, line 6, *for* " E. Africa " *read* " South Africa."

238, line 1, *for* " Dory " *read* " Dorey."

243, line 2, *for* " Teapa, Tabasco " *read* " Teapa in Tabasco."

255, line 22, *read* " Chiriqui in Panama."

264, line 9, *delete* " popular."

,, line 10, *for* " as to " *read* " upon."

IN THE DESCRIPTIONS OF PLATES.

PLATE

2, *insert* " fig. 4b is an outline of the natural size."

6, *for* " 7a " *read* " 7b "; *and for* " 7b " *read* " 7a."

14, fig. 2, *for* " clavager " *read* " claviger."

25, fig. 3, *for* " maculata " *read* " quadrimaculata."

28, fig. 6, *for* " Entaphinus " *read* " Entaphiu."

33, fig. 2, *for* " Chelyoides " *read* " Chelyoidea."

35, fig. 2, *for* " dicera " *read* " diceros."

PLATE

36, fig. 6, *for* " semibrunneata " *read* " semibrunea."

37 and 38, fig. 2, *for* " Eurytea " *read* " Euritea."

40, fig. 9, *for* " semifasciatum " *read* " semifasciata."

41, fig. 1, *for* " semifasciatum " *read* " semifasciata."

,, fig. 2, *Godingia guerreroensis* is figured but has been omitted in the text.

46, fig. 1, *for* " grobulare " *read* " globulare."

INDEX TO GENERA AND SPECIES.

Synonyms are in italics.

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FINIS.

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PLATE I.

Fig. 1. *Xerophyllum servillei*, page 30. Imago, showing the foliaceous character of the femora, and the bark-like appearance of the pronotum.

Fig. 1*a*. Head, frons, and clypeus of the same insect. The absence of a proboscis and also of any apparent mandibles may be noted. Possibly a dissection of a recent specimen may show rudiments of cutting-jaws under the scale, below the clypeus. The antennæ are short and filiform.

Fig. 1*b*. The fore leg much enlarged, with its leaf-like femur.

Fig. 1*c*. Middle leg of the same insect.

Fig. 1*d*. The broad femur of the hind leg, showing the extreme end of the tibia, furnished with spurs. The three irregular tarsal joints of the feet are certainly abnormal in form.

Fig. 2. *Xerophyllum corticis*, page 31. A larger insect than the last, and showing certain differences in the pronotum.

Fig. 3. *Xerophyllum minor*, page 31. Considerably smaller, and having the femora less complex.

Fig. 4. *Membracis flaveola*, page 31. Imago. One of the largest insects of this genus.

Fig. 4*a*. Larval form, or possibly the exuviæ or slough of the same.

Fig. 4*b*. Pupa of the same, showing the incipient growth of the pronotum of the adult insect. Also the small representatives of the tegmina and wings.

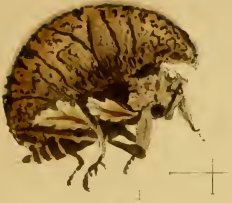
Fig. 4*c*. Tegmen and wing of *M. flaveola*.

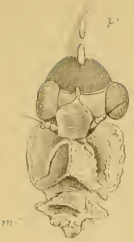
Fig. 4*d*. Front view of the same, with eyes, ocelli, and part of the pronotum seen edgewise.

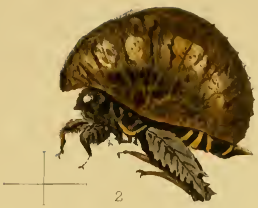
Fig. 4*e*. The middle and the hind legs.

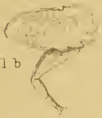
Fig. 5. *Membracis fusca*, page 33. Imago, with the pronotal edge corrugated and showing the peculiar valvular termination of the abdomen.

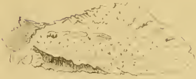
PLATE I

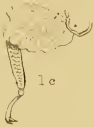


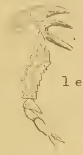


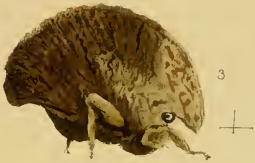


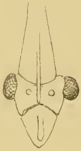


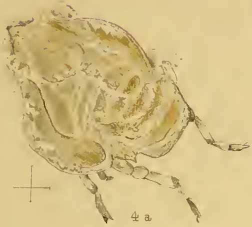


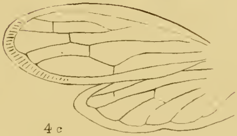


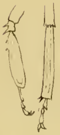


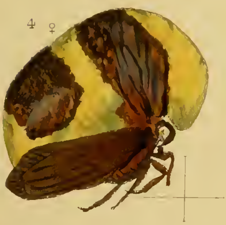


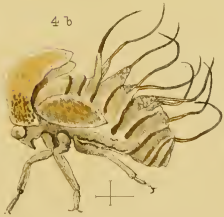












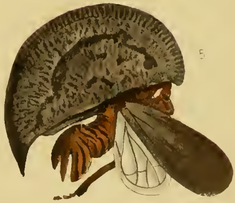


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PLATE II.

Fig. 1. *Membracis foliata*, page 33, or *M. C. album*; var. of *M. flaveola* (?).

Fig. 1*a*. The front view of the same. The minute hair-like antennæ are often lost in dry specimens.

Fig. 2. Male of the same, with its expanded wings.

Fig. 2*a*. Spatulate fore leg of the same insect.

Fig. 2*b*. The last abdominal rings of the male, showing no genital valves.

Fig. 3. *Membracis lunata*, page 34. The union of the two hindermost white bands would constitute the variety *M. C. album*.

Fig. 4. *Membracis continua*, page 34.

Fig. 4*a*. Larval form of the same.

Fig. 5. *Membracis mexicana*, page 35.

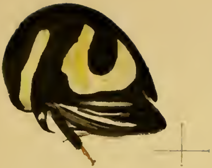
Fig. 5*a*. Front view of the frons of the same insect.

Fig. 6. One of several varieties of the same species.

Fig. 7. *Membracis arcuata*, page 35.

Fig. 7*a*. Front view of the head, &c.

Fig. 8. *Membracis nebulosa*, page 36. The crena or notch in the sub-margin of the pronotum may be here noted.



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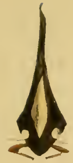

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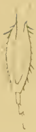

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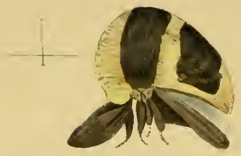

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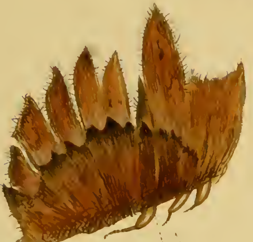

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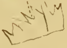

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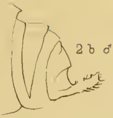

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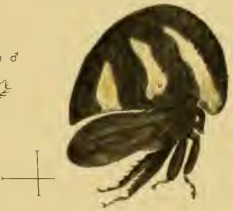

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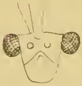

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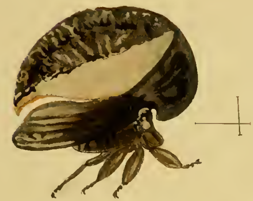

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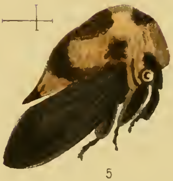

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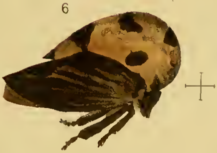

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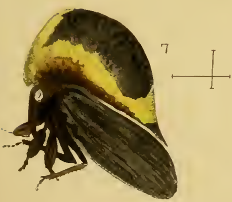

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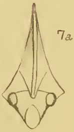

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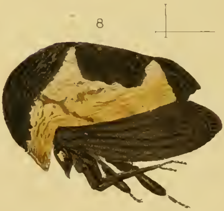

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PLATE III.

Fig. 1. *Phyllotropis suffusa*, page 38. Imago. Profile view.

Fig. 1*a*. Head and proboscis, with its setæ, and also the antennæ, seen by the front view.

Fig. 2. *Phyllotropis fasciata*, page 38.

Fig. 3. *Phyllotropis tectigera*, page 39.

Fig. 4. *Phyllotropis alta*, page 40.

Fig. 5. *Phyllotropis confinis* ♂, page 41.

Fig. 5*a*. *Phyllotropis confinis* ♀.

Fig. 6. *Phyllotropis provittata*, page 42.

Fig. 6*a*. Frons and a front leg.

Fig. 6*b*. Valves of the female.

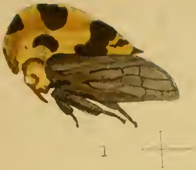
Fig. 6*c*. Details of the hind leg.

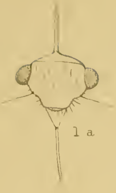
Fig. 7. *Phyllotropis subtecta*, page 42.

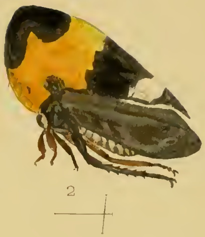
Fig. 8. *Cryptonotum militare*, page 43.

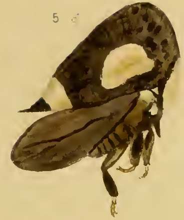
Fig. 8*a*. Front view of the head.

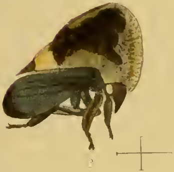
PLATE III

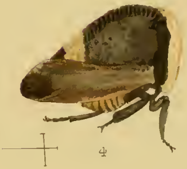


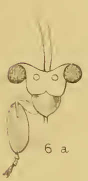


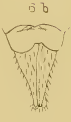


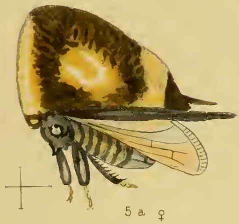


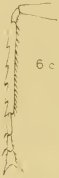


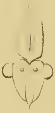


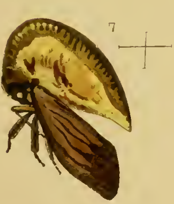


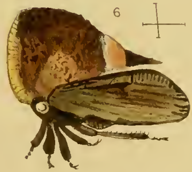












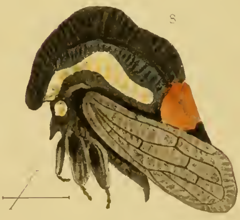


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PLATE IV.

Fig. 1. *Phyllotropis exigua*, page 42.
Fig. 2. *Phyllotropis lefebvrei*, page 42.
Fig. 2*a*. Front view of head.
Fig. 3. *Phyllotropis humilis*, page 43.
Fig. 3*a*. Front view of the frons.
Fig. 4. *Phyllotropis quadricolor*, page 43.
Fig. 5. *Enchophyllum cruentatum*, page 44.
Fig. 5*a*. Head, part of the recurved horn, and the front legs.
Fig. 6. *Enchophyllum melaleucum*, page 44.
Fig. 6*a*. Front aspect.
Fig. 6*b*. Pronotum seen from above.
Fig. 6*c*. Tegmen with neuration.
Fig. 7. *Enchophyllum maculatum*, page 45.
Fig. 8. *Enchenopa lanceolata*, page 45.
Fig. 8*a*. Head and frons.
Fig. 9. *Enchenopa monoceros*, page 46.
Fig. 9*a*. Head and part of pronotum.
Fig. 9*b*. Tegmen with its coarse neuration.
Fig. 9*c*. Foot and tibia, the last spatulate and hirsute, also the hind leg of the same.

PLATE IV

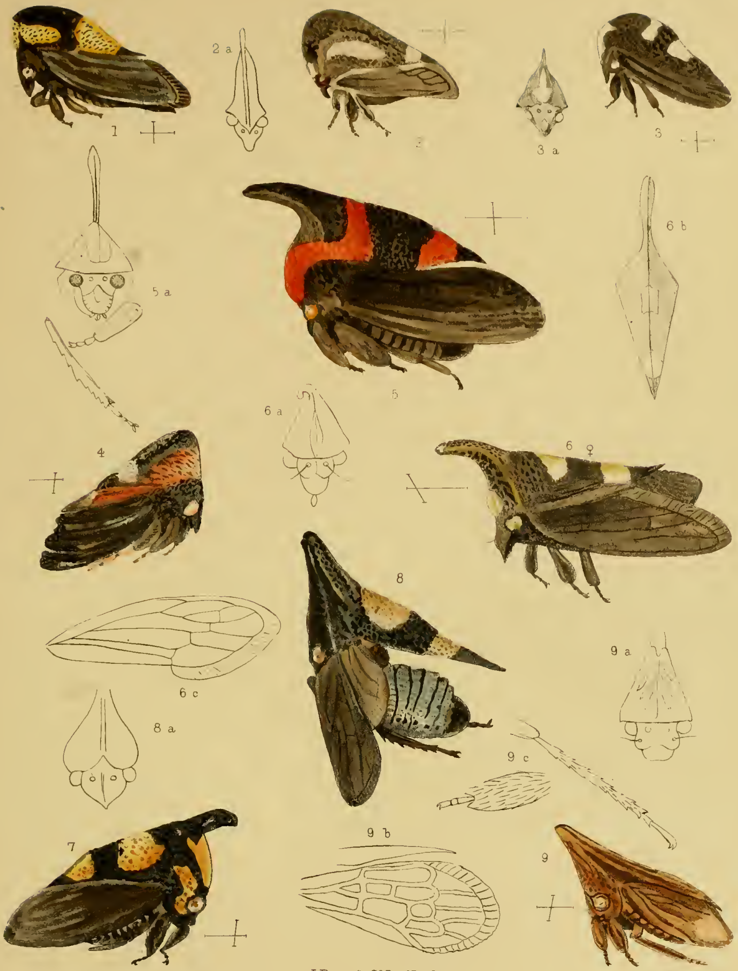
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PLATE V.

Fig. 1. Tegmen of *Enchenopa lanceolata*, page 45.
Fig. 2. *Enchophyllum dubium*, page 46.
Fig. 3. *Enchenopa bi-notata* ♂, page 47.
Fig. 3*a*. *Enchenopa bi-notata* ♀.
Fig. 4. *Enchenopa fulica*, page 47.
Fig. 5. *Enchenopa nutans*, page 47.
Fig. 6. *Enchenopa ephippii*, page 48.
Fig. 6*a*. Tegmen of the same.
Fig. 7. *Enchenopa gladius*, page 48.
Fig. 7*a*. Front view, with the fore legs.
Fig. 8. *Enchenopa sericea*, page 48.
Fig. 9. *Enchenopa serratipes*, page 49.
Fig. 10. *Enchenopa ferruginea*, page 49.
Fig. 10*a*. Front view of the head.
Fig. 10*b*. Apex of the procephalon with its carinæ.

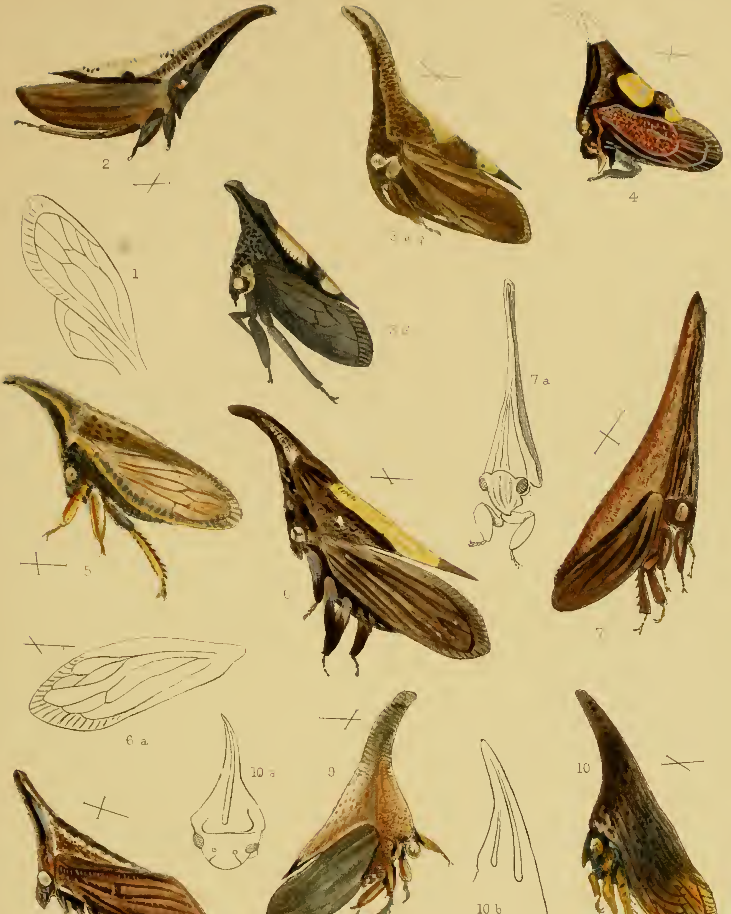
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PLATE VI.

Fig. 1. *Enchenopa tesselata*, page 49.
Fig. 2. *Enchenopa latipes*, page 49.
Fig. 2*a*. The front view of the head.
Fig. 3. *Enchenopa auropicta*, page 50.
Fig. 3*a*. The insect with wings expanded.
Fig. 3*b*. The front view.
Fig. 4. *Enchenopa ignidorsum*, page 50.
Fig. 4*a*. The front aspect of head.
Fig. 5. *Enchenopa porrecta*, page 51.
Fig. 5*a*. Head and the fore-leg.
Fig. 5*b*. Genital valves of the ♀.
Fig. 6. *Enchenopa sericea*, after Godman and Salvin, page 51.
Fig. 7. *Enchenopa minamen*, page 51.
Fig. 7*a*. The prominent and almost sessile eye.
Fig. 7*b*. The tegmen. The neuration is peculiar.
Fig. 7*c*. Stellate dots or punctures on the pronotum.

PLATE VI

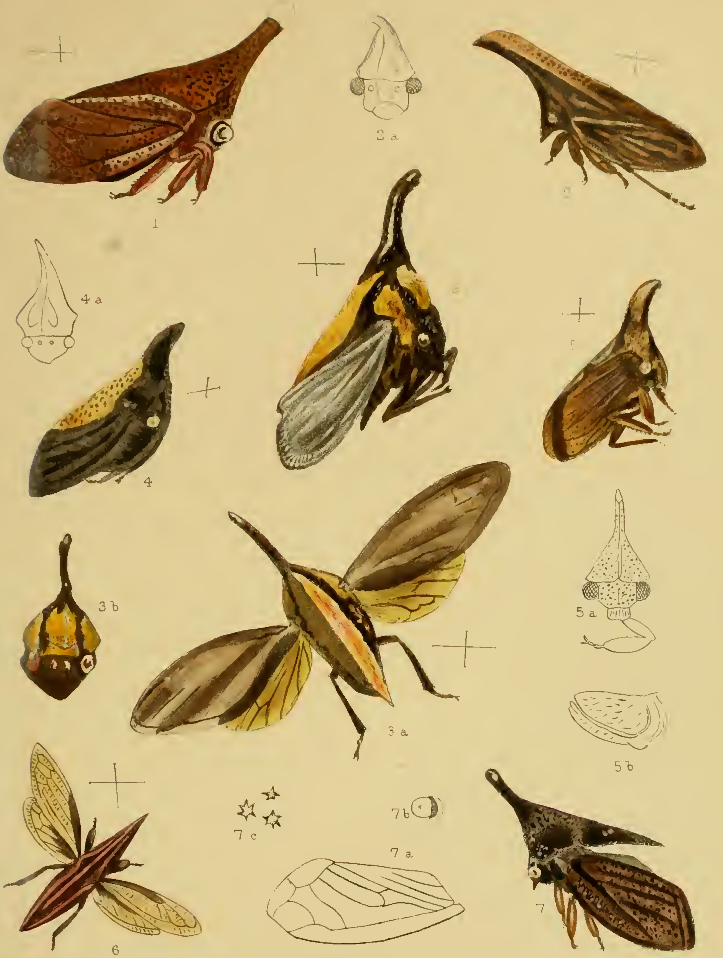
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PLATE VII.

Fig. 1. *Tropidocyta sallæi*, page 52.
Fig. 2. *Tropidocyta succedanii*, page 62.
Fig. 2*a*. The head and frons.
Fig. 2*b*. The tegmen.
Fig. 2*c*. The dorsum and carinæ.
Fig. 3. *Tropidocyta minor*, page 53.
Fig. 3*a*. The frons and metopidium.
Fig. 4. *Tropidocyta guyanensis*, page 53.
Fig. 4*a*. The frons and metopidium.
Fig. 4*b*. The tegmen.
Fig. 4*c*. Middle and hind leg.
Fig. 5. *Tropidocyta punctipes*, page 53.
Fig. 5*b*. Head and long antennæ.
Fig. 6. *Leiocyta cornutula*, page 54.
Fig. 6*a*. Head and overhanging metopidium.
Fig. 6*b*. Tegmen.
Fig. 7. *Tylopelta gibbera*, page 55.
Fig. 8. *Tylopelta exusta*, page 55.
Fig. 8*a*. Head and frons.
Fig. 8*b*. Wing of the same insect.
Fig. 8*c*. Trochanter, femur and tarsus.
Fig. 8*d*. Serrated hind tibia and tarsus.

PLATE VII

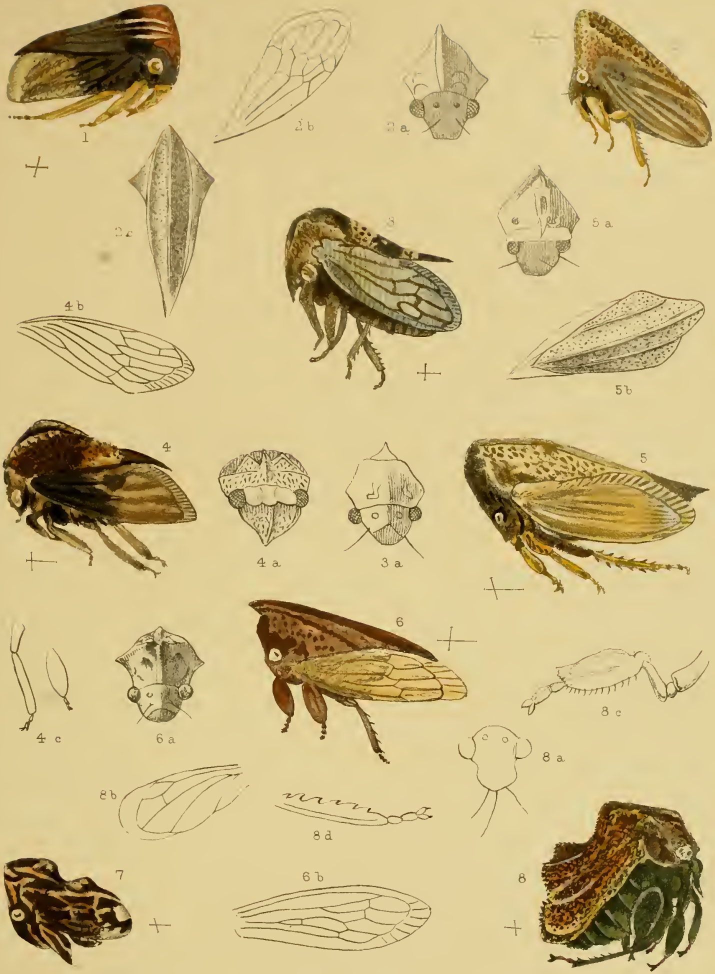
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PLATE VIII.

Fig. 1. *Philya vitripennis*, page 56.
Fig. 2. *Philya bicolor*, the male, page 56.
Fig. 2*a*. The female.
Fig. 2*b*. Front view of the pronotum.
Fig. 2*c*. Valves of the female.
Fig. 2*d*. The middle tibia.
Fig. 3. *Philya strigillata*, page 57.
Fig. 3*a*. Head and metopidium.
Fig. 3*b*. The middle tibia, hirsute.
Fig. 4. *Philya parvula*, page 57.
Fig. 5. *Scalmophorus reticulatus*, page 58.
Fig. 5*a*. Neuration of the tegmen (after Fowler).
Fig. 6. *Hypsoprora insignis*, page 58.
Fig. 6*a*. Front view of head and pronotum.
Fig. 7. *Hypsoprora coronata*, page 59.

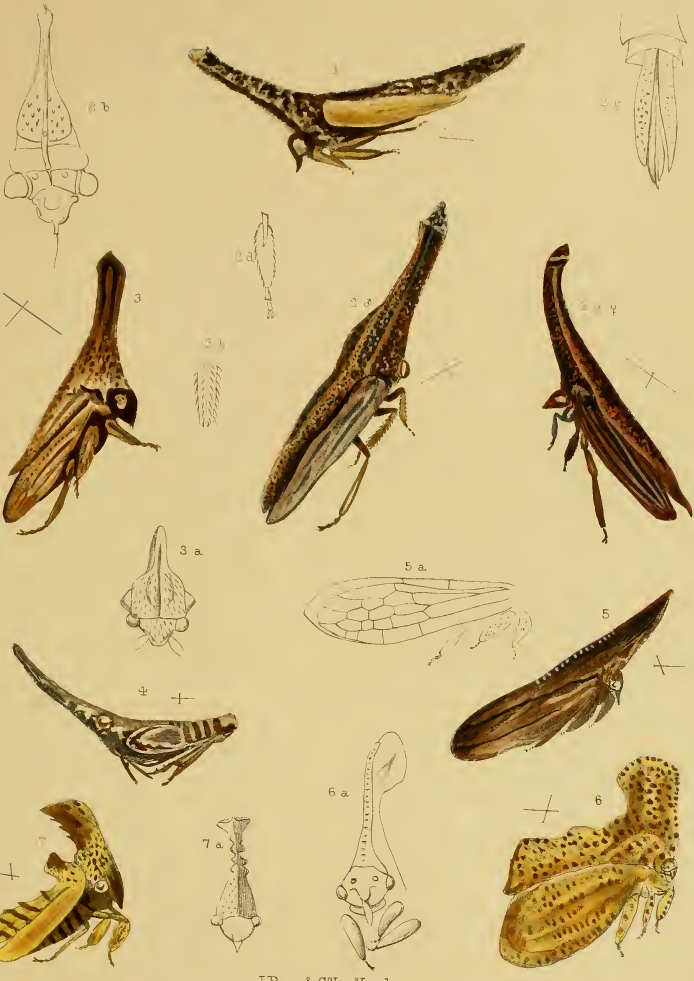
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PLATE IX.

Fig. 1. *Hypsoprora anatina*, page 60. Imago, with its high and dilated cephalic horn and its setose dorsum. The white flannel-like blotches are remarkable with the black punctures on the white legs.

Fig. 1*a*. The head, frons, and procephalon seen by front view.

Fig. 2. *Hypsoprora cassis*, page 60. The male, with the procephalon broadly dilated. The legs are slightly spatulose.

Fig. 3. The female of the same insect. Rather larger and heavier.

Fig. 3*a*. Front view, showing the expanded top of the procephalon. The ocelli of these insects are markedly developed.

Fig. 4. *Hypsoprora costata*, page 61. The middle tibiæ are broadly spatulate.

Fig. 4*a*. Front view of the same, showing the incipient development of the suprahumeral processes and a dorsal tubercle.

Fig. 5. *Bolbonota insignis*, page 62. The globose form of this and other species of the present genus may be noted.

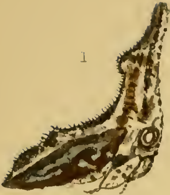
Fig. 5*a*. Head seen from the front and in perspective fore-shortening.

Fig. 6. *Bolbonota plicata*, page 63. Showing the brocaded tegmina and the transparent under-wings

Fig. 6*a*. The dorsal aspect of the pronotum, showing the peculiar plicated or laminated structure of the upper part.

Fig. 7. *Bolbonota grisea*, page 63. The tips of the tegmina are semi-transparent.

Fig. 8. *Bolbonota luzonica*, page 64. The singularly broad head and pronotum, and diminutive abdominal parts, together with the absence of dorsal and humeral processes, make it difficult to realise the characters which include these insects under the groups before described as *Membracinæ*. The insect figured is probably a male.



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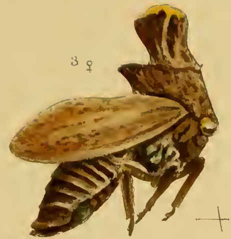

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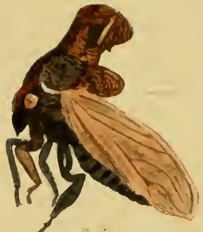

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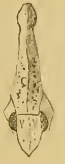

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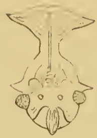

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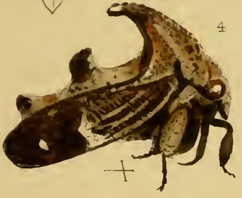

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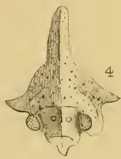

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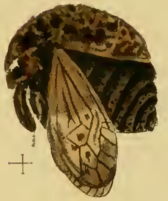

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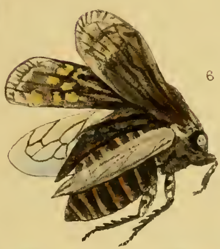

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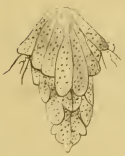

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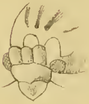

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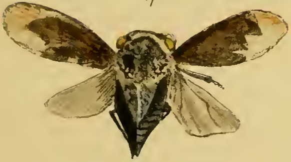

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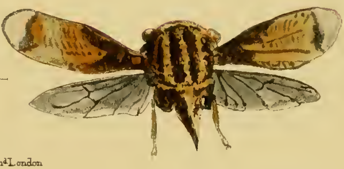

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PLATE X.

Fig. 1. *Bolbonota trivialis*, page 64. Tegmina dark. Wing is seen in the figure above them.

Fig. 2. *Bolbonota digesta*, page 64. Wings marked with dark cloudy stains.

Fig. 3. *Bolbonota quadripunctata*, page 65. Imago seen with expanded wings. Tegmina, each with two obvious spots and sometimes, as in the figure, seen with a third near the cubitus.

Fig. 3*a*. The same insect viewed from the dorsal aspect. The upper part of the pronotum is deeply sulcate, the lower part punctate. The antennae visible above the head.

Fig. 3*b*. The tegmina have a coarse neuration, fringed with fine yellow hairs, not shown in the figure.

Fig. 3*c*. The hind leg.

Fig. 3*d*. The second pair of tibiae.

Fig. 3*e*. The frons and part of the metopidium.

Fig. 4. *Bolbonota quinque-lineata*, page 65. A dark and obscure species.

Fig. 5. *Bolbonota atomaria*, page 65. The imago is shining black, with ochreous tips to the tegmina.

Fig. 5*a*. The same seen from the dorsal aspect. Very rugose.

Fig. 5*b*. Frons and part of the pronotum.

Fig. 6. *Bolbonota teter*, page 66. The imago. Comparatively a large species.

Fig. 6*a*. The frons and part of the pronotum.

Fig. 7. *Bolbonota cuneata*, page 66.

Fig. 7*a*. The front aspect. Very much furrowed above the frons.

Fig. 8. *Bolbonota corrugata*, page 66. The imago.

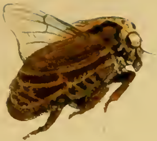
Fig. 8*a*. The frons and corrugated metopidium.

Fig. 9. *Bolbonotodes ganglbaueri*, page 67.

Fig. 9*a*. The corrugated frons.

Fig. 9*b*. The tegmen and wing.

PLATE I.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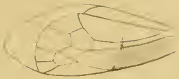
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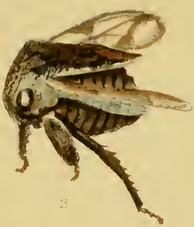
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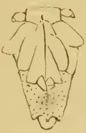
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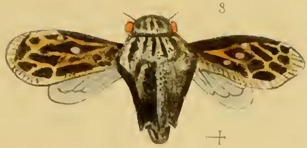
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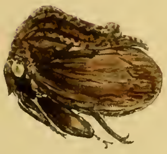
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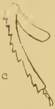
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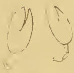
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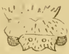
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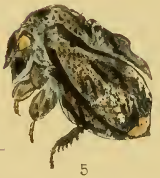
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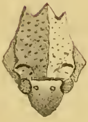
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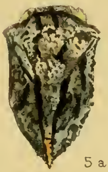
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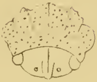
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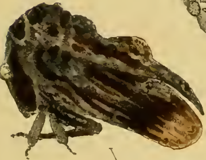
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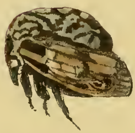
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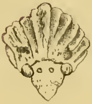
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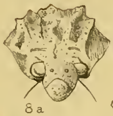
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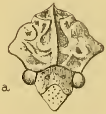
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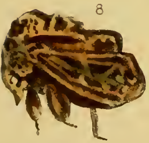
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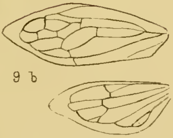
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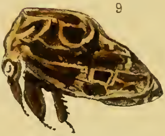
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PLATE XI.

Fig. 1. *Pterygia arietina*, page 69. Imago.

Fig. 1*a*. Front view of frons and short supra-humerals.

Fig. 1*b*. The dorsal spinose protuberance.

Fig. 1*c*. The middle leg of the same insect.

Fig. 2. *Pterygia cerviceps*, page 69. Imago.

Fig. 2*a*. The frons by the front aspect.

Fig. 3. *Pterygia hispida*, page 70. Imago, showing the free pronotum with its tubercles. The spatulose form of the front legs is overdrawn in the figure.

Fig. 4. *Pterygia postica*, page 70. Imago. The female, with expanded wings seen in perspective. The tegmina have their insertions below, not above the pronotal margin, as here is drawn.

Fig. 4*a*. The tegmen and wings of the same.

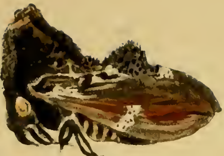
Fig. 5. *Pterygia postica*, page 70. Imago. The male, which is smaller. The white portion in the figure is a patch of pilose matter.

Fig. 5*a*. The terminal rings of the abdomen.

Fig. 6. *Pterygia dæmoniaca*, page 71. Imago black and spinose.

Fig. 6*a*. Front view of the head and the almost foliaceous frons. The fore legs are slightly spatulate.

PLATE XI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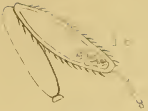
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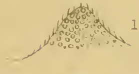
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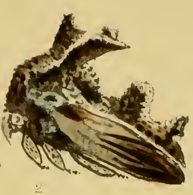
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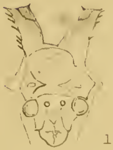
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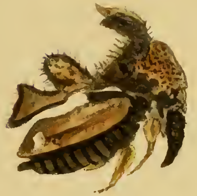
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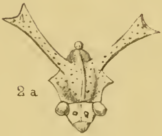
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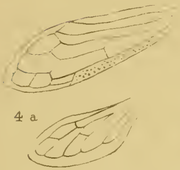
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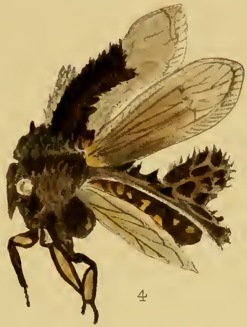
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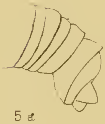
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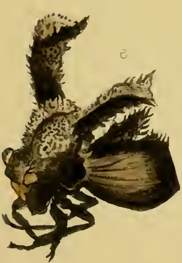
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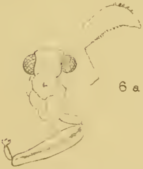
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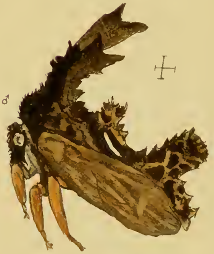
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PLATE XII.

Fig. 1. *Pterygia Satanas*, page 71. Imago variegated with white pilose matter.

Fig. 1*a*. The front aspect, showing the leaf-like frons and the serrated supra-humerals.

Fig. 2. *Pterygia rubicunda*, page 72. Imago.

Fig. 3. *Pterygia uropigii*, page 72. Imago, with its characteristic caudal process.

Fig. 3*a*. The supra-humeral process seen at different angles, and therefore apparently non-symmetrical. Also the frons and ocelli.

Fig. 4. *Pterygia spinula*, page 72. Imago variegated with white patches.

Fig. 4*a*. Head, frons, and fore-femora.

Fig. 5. *Pterygia horrifica*, page 73. Imago with clubbed and spinose supra-humerals.

Fig. 6. *Pterygia concolor*, page 73. Imago with its overhanging pronotum.

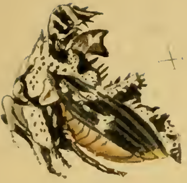
Fig. 6*a*. Tegmen with ochreous patches.

Fig. 7. *Pterygia nox*, page 73. Imago, probably of the female.

Fig. 7*a*. Front view of the same insect with its mitre-like supra-humerals.

Fig. 8. *Pterygia nox*, either a variety, or the male of that species. The white marking of the figure represents only the glance from the shining jet-black surface.

Fig. 8*a*. Front view of the same insect.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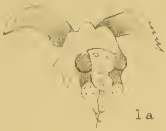
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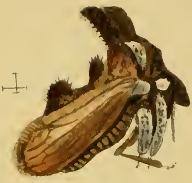
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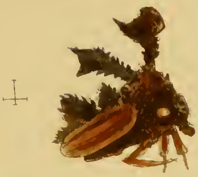
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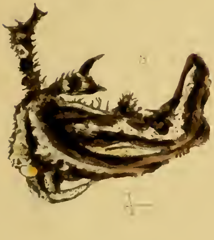
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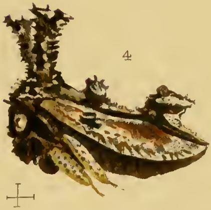
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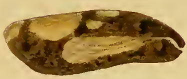
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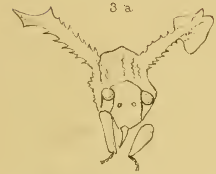
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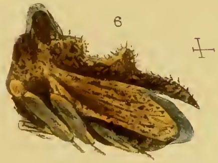
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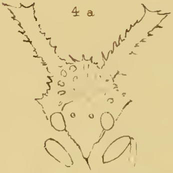
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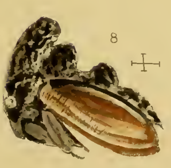
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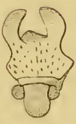
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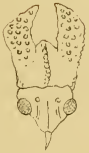
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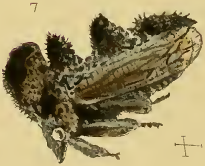
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PLATE XIII.

Fig. 1. *Pterygia quadridens*, page 74. The antler-like forms of the shoulder processes are distinctive. This form is better shown by the front view.

Fig. 1*a*. The head and its adjuncts. The summits of the horns are different in form from those seen in profile.

Fig. 2. *Pterygia tenuicornis*, page 74. Imago. The horns are sub-clavate.

Fig. 3. *Pterygia tripodia*, page 74. Not unlike the last species, but the legs are more spatulate, and the insect is larger.

Fig. 3*a*. Frons and metopidium.

Fig. 4. *Pterygia flavopuncta*, page 75. (*Xanthosticta?*) Perhaps allied to the genus *Bolbonota*. The legs are not dilated or spatulate.

Fig. 5. *Sphongophorus championi*, page 77. Imago enlarged by permission from the figure given in the Biologia Centrali Americana.

Fig. 5*a*. Head of the same insect.

Fig. 6. *Sphongophorus robustulus*, page 77. Imago copied from the B.C.A.

Fig. 6*a*. Front view of the head of the same.

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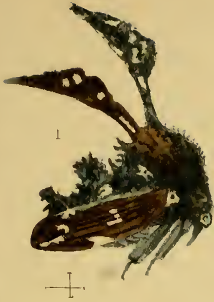

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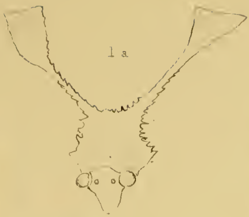

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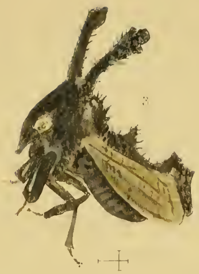

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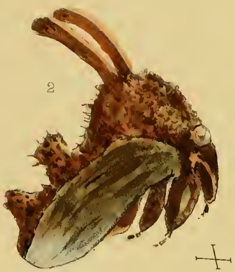

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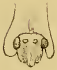

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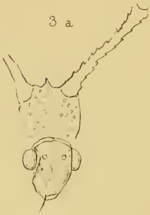

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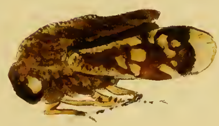

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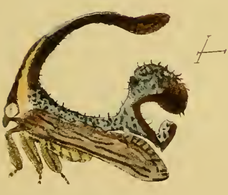

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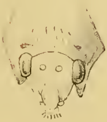

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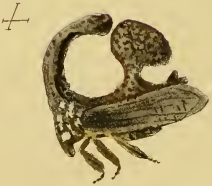

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PLATE XIV.

Fig. 1. *Sphongophorus ballista*, page 78. The cephalic and the pronotal posterior horns almost meet, but the variation in length is not constant.

Fig. 1*a*. The tip of the cephalic horn is grooved.

Fig. 2. *Sphongophorus clavager*, page 78. A male specimen, which wants the erect caudal process.

Fig. 2*a*. The tip of the cephalic horn as seen in the last insect.

Fig. 3. *Sphongophorus paradoxa*, page 79. The form of the cephalic horn is inconstant. The female is rather smaller than the male and sometimes wants the clubbed extremity cleft like a fish-tail as shown in my figure representing the male insect.

Fig. 3*a*. Front view showing the head and frons and part of the erect cephalic horn, also the first and second tibiæ and tarsus.

Fig. 3*b*, 3*c*. Details of the legs. The tibia spreads on each side like a leaf, and the tarsi are very slender.

Fig. 4. *Sphongophorus nodosus*, page 79. Imago with its gnarled head-process, which has much the appearance of a bird's excretion or a dark fungus.

Fig. 4*a*. Head and part of the pronotum.

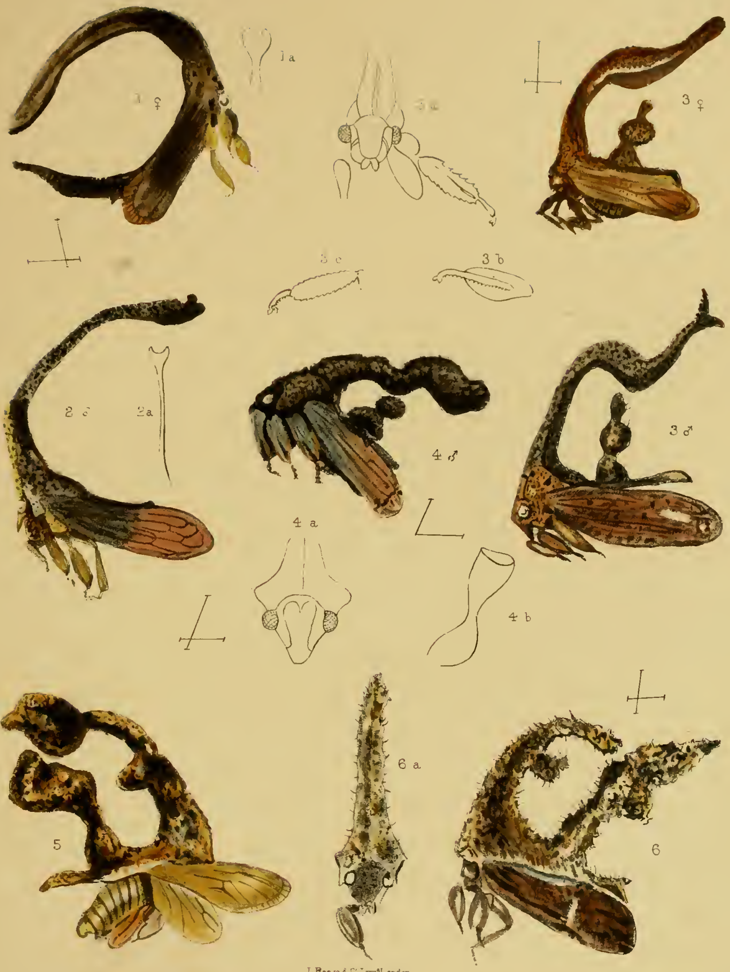
Fig. 4*b*. The top of the cephalic horn with its truncate extremity.

Fig. 5. *Sphongophorus bi-clavatus*, page 79. Imago with its curious fungi-form dilations like nodules of bark. These excrescences are hollow, otherwise it would seem to be an impossibility for the insect to keep its equilibrium in flight. The alæ or wings are well developed.

Fig. 6. *Sphongophorus dorsalis*, page 80. This insect has much the appearance of a fragment of variously coloured lichen.

Fig. 6*a*. The finely prickly character of the frons and the upright procephalon will carry out the deceptive appearance of lichen-covered bark.

PLATE XIV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West Newman imp

PLATE XV.

Fig. 1. *Sphongophorus parvulus*, page 80. Imago. A small species from the Amazons river.

Fig. 2. *Sphongophorus intermedius*, page 80. Imago.

Fig. 2*a*. Front view of the head with the cephalic horn cleft like that of the Asiatic genus *Hypsauchenia*.

Fig. 3. *Sphongophorus lividus*, page 81. Imago with the head and dorsal processes flattened and acute.

Fig. 4. *Sphongophorus inflatus*, page 81. Imago. Remarkable for its inflated and fungoid pronotum.

Fig. 4*a*. Frons with its hair-like antennæ.

Fig. 4*b*. Sculpturing of the pronotum, much magnified.

Fig. 5. *Sphongophorus latifrons*, page 81. Imago. Large and clumsy in form. ♂.

Fig. 5*a*. Front view of head and fore-leg.

Fig. 6. *Sphongophorus inelegans*, page 82. ♀. Showing the bark-like form of the imago.

Fig. 7. Tegmen of *Sphongophorus ballista*, see Plate XIV.

Fig. 8. The clavate top of the same species, magnified. ♂.

Fig. 9. Similar part of a variety of *S. ballista*.

Fig. 10. Frons and head of the same insect.

PLATE [illegible]

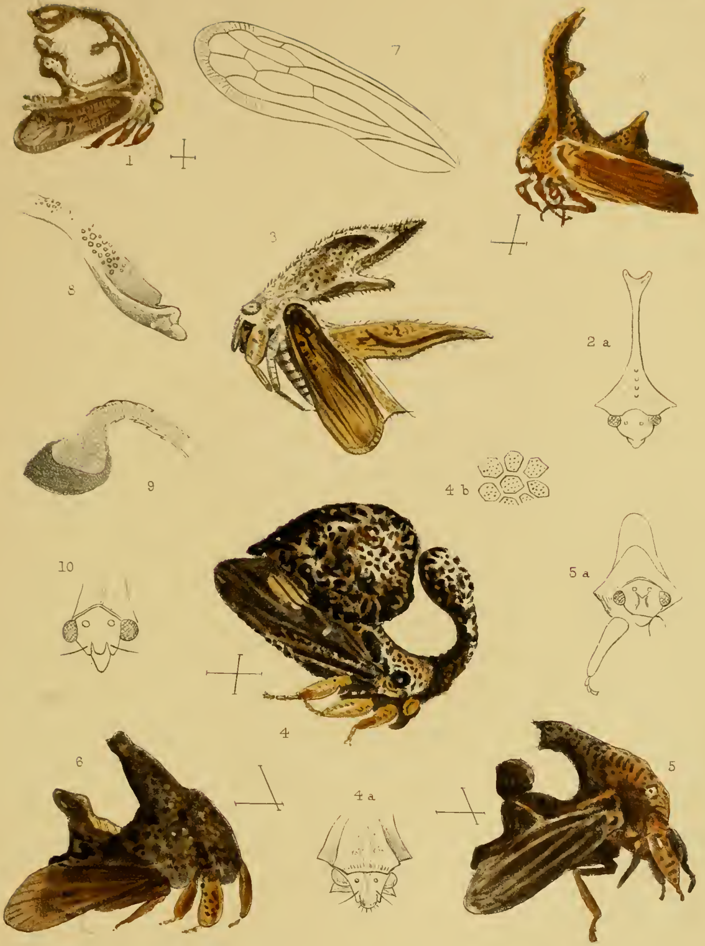
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PLATE XVI.

Fig. 1. The male form of *Umbonia nigrata*, page 84. Formerly named *Physoplia nigrata*, by Walker. Canon Fowler considers that all these last-named insects, with the erect truncated processes, are varieties of *Umbonia orozimbo.*

Fig. 2. The male form of *Umbonia crassicornis*, page 84. Notwithstanding the different form and the great size of this insect, Fowler for good reasons thinks this, like the last, is a variety of *Umbonia orozimbo.*

Fig. 2*a*. The front view of the frons, and part of the metopidium. The dorsal process is not drawn.

Fig. 3. *Umbonia media* or *Physoplia media* of Walker, page 85. A fine green variety drawn from my own collection. Also, according to Stål, this is the male of *U. orozimbo.*

Fig. 3*a*. The underside of the last abdominal rings showing the male characters of the insect.

Fig. 4. The female form of *Umbonia orozimbo*, page 86. The strong dorsal spine with its red point well represents or counterfeits the protective thorn of some prickly shrub.

Fig. 4*a*. *Umbonia orozimbo*, page 86. A remarkable female variety.

Fig. 4*b*. The front view of the same insect.

Fig. 5. *Umbonia picta*, page 86.

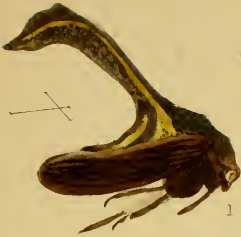
Fig. 5*b*. The head, supra-humeral process, and spine seen from the front.

Fig. 6. *Umbonia spinosa*, page 87. The expanded imago.

Fig. 6*a*. The front view of the insect.

Fig. 5*a*. The neuration of the tegmen and the wing.

PLATE XVI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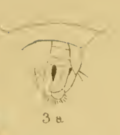
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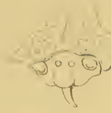
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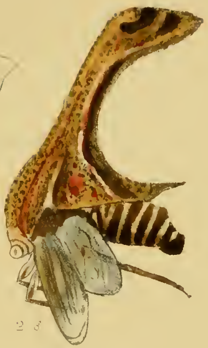
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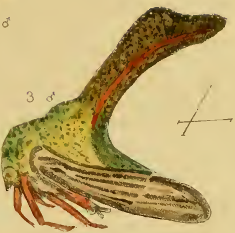
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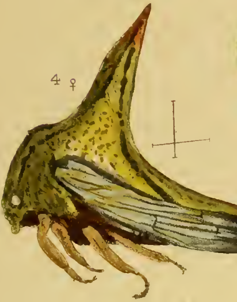
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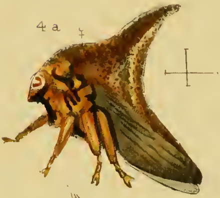
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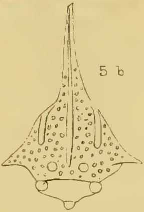
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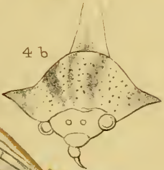
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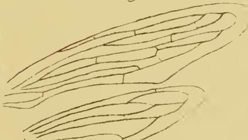
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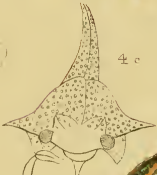
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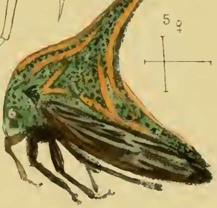
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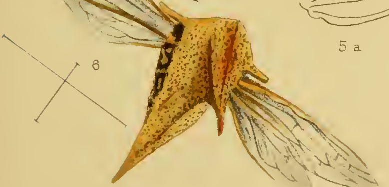
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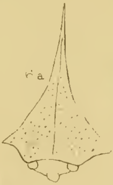
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PLATE XVII.

Fig. 1. *Umbonia Javanensis*, page 87.

Fig. 2. *Umbonia reclinata*, page 88. The male insect with its sloping spine.

Fig. 3. *Umbonia pyramidalis*, page 88.

Fig. 3*a*. Frons and short spine, seen in perspective. A large insect.

Fig. 3*b*. The female parts as seen under the pronotum and tegmina.

Fig. 4. *Umbonia subclivata*, page 88. The female.

Fig. 5. *Umbonia ataliba*, page 89.

Fig. 5*a*. Front view, with the supra-humeral processes.

Fig. 6. *Umbonia gladius*, page 89. The female.
N.B. Probably this species would be better ranged with *Platycotis*.

Fig. 7. *Umbonia articularia*, ♀, page 89.

Fig. 8. The same insect with its expanded hyaline tegmina and wings which show the elongated arrear. The legs are concealed by the body of the insect.

Fig. 8*a*. Frons, shoulder-horns and upright spine, seen in perspective.

PLATE XVII

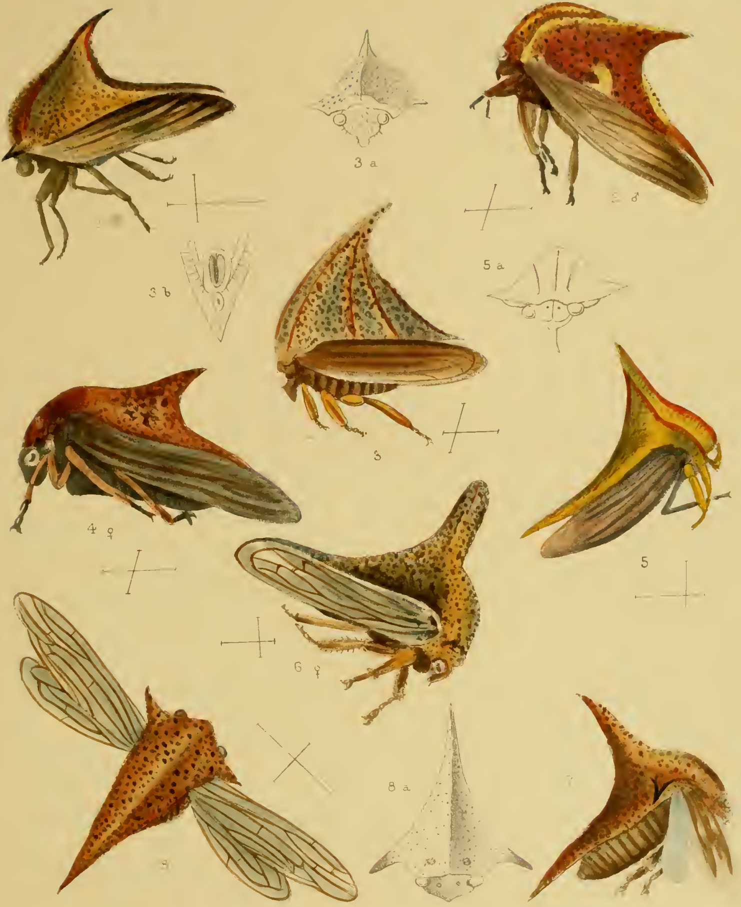
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PLATE XVIII.

Fig. 1. *Triquetra grossa*, page 91. Imago with its conspicuous supra-humeral processes and horn. The male insect.

Fig. 2. The female of the same.

Fig. 2*a*. The front view of the same insect.

Fig. 3. *Triquetra submaculata*, page 92.

Fig. 3*a*. Frons with the dark spot on the metopidium.

Fig. 3*b*. Pronotum in profile.

Fig. 4. *Triquetra negrostrigata*, page 92. The dorsal horn is small.

Fig. 4*a*. Frons and metopidium.

Fig. 5. *Microschema obtusa*, page 92. The dorsal horn is obsolete.

Fig. 5*a*. The head seen from below and slightly fore-shortened.

Fig. 6. *Microschema inermis*, page 93. Imago with no dorsal spine. The male

Fig. 6*a*. Dorsal view of the same insect.

Fig. 6*b*. The tegmen with its numerous transverse nervures.

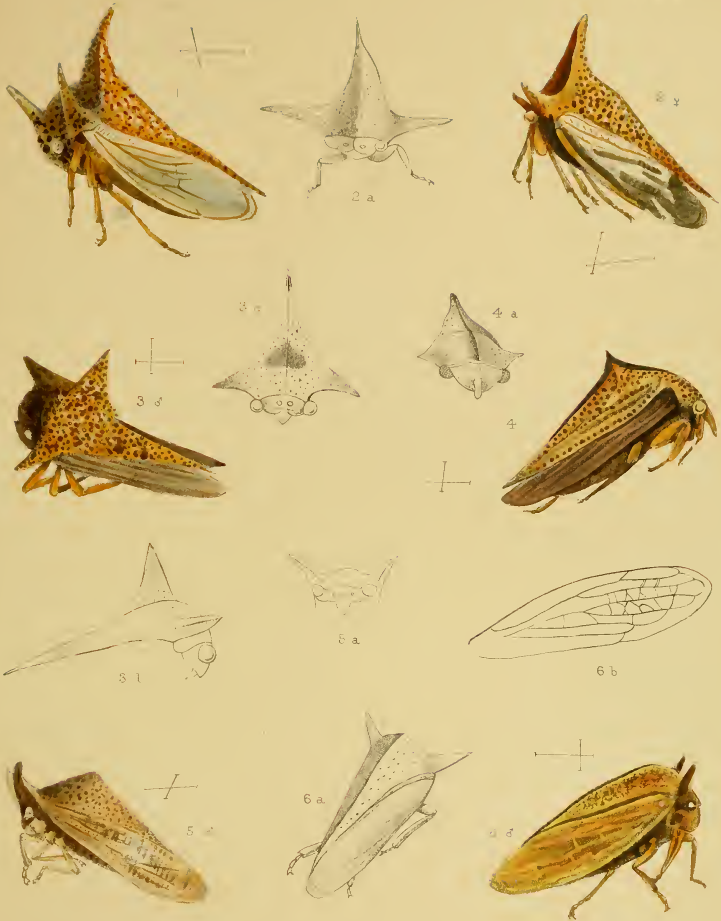
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PLATE XIX.

Fig. 1. Imago of *Triquetra insipida*, page 94.

Fig. 1*a*. Front view of the frons and metopidium.

Fig. 2. Tegmen or upper wing of *Trequetra grossa*, showing the transverse reticulation.

Fig. 3. Imago of *Hoplophora sanguinosa*, seen in perspective. Its bee-like character will be noted. The pronotum is free at the apex, page 94.

Fig. 3*a*. Front view of the frons and foreleg.

Fig. 3*b*. Underside of the last abdominal segments

Fig. 4. *Hoplophora monogramma*, page 95.

Fig. 4*a*. Variety of the same (?) *H. apiformis*.

Fig. 4*b*. Head and frons of the same insect.

Fig. 4*c*. Second and third legs showing the dissimilar tarsi.

Fig. 5. *Hoplophora pubescens*, with its short pronotum and supra-humeral processes, page 96.

Fig. 5*a*. Head and leg in front view.

Fig. 5*b*. The hind tibia with its minute tarsi and joints.

Fig. 6. The Pupa of *Hoplophora pertusa*. With the double spine proceeding from the rudimentary scutellum, which spine does not occur in the imago. The tegmina here are well developed, page 98.

PLATE XIX

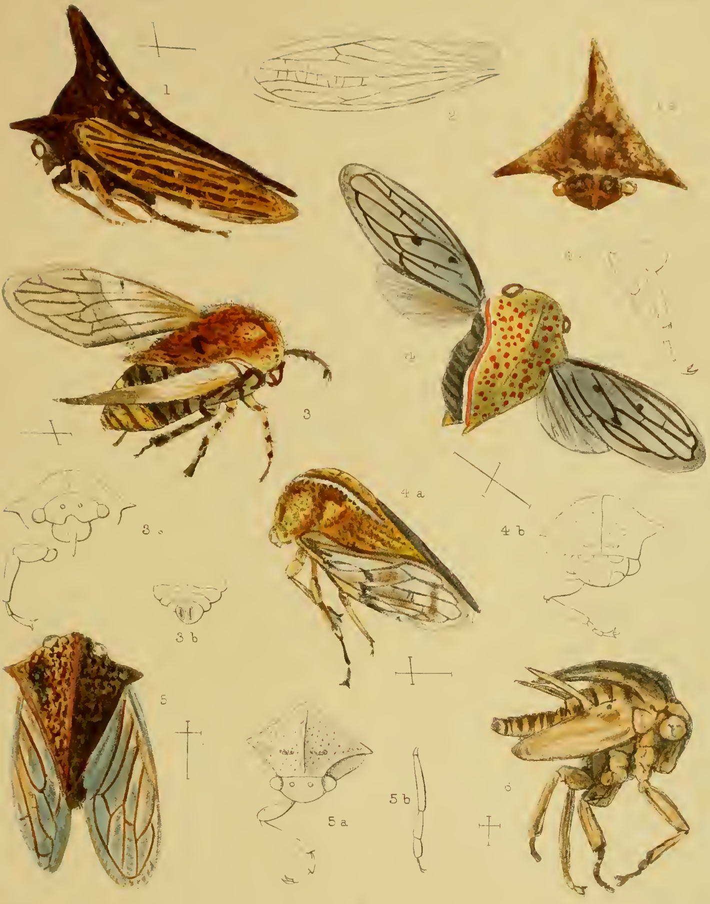
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PLATE XX.

Fig. 1. Imago of *Hoplophora pertusa*, page 96.

Fig. 1*a*. Head and metopidium of the same. The spots above are depressions, not ocelli.

Fig. 1*b*. The pronotum seen from above. The line drawn across the shoulders in the figure is too much pronounced. *x*, *y*, *z* show respectively the first, second and hind legs of the same insect.

Fig. 2. *Hoplophora porosa* of Walker, possibly a variety of *H. pertusa*, page 96.

Fig. 2*a*. Part of the pronotum and the tegmen.

Fig. 2*b*. Front view of the head and metopidium.

Fig. 3. The larva of *Hoplophora*, showing the abdominal flaps to the segments, page 97.

Fig. 4. Imago of *Hoplophora gigantea*. The neuration of the wings follows the broad coloured streaks on the membrane, page 98.

Fig. 4*a*. Frons and part of the metopidium.

Fig. 5. *Hoplophora cineria*, from the dorsal aspect. The auriculate processes may be noted, page 98.

Fig. 5*a*. Frons and metopidium.

Fig. 6. Imago of *Hoplophora vicina*, with its scutelliform pronotum which resembles that of the last named species, page 99.

Fig. 7. *Hoplophora disparipes*, showing the dissimilarity of the legs, &c., page 99.

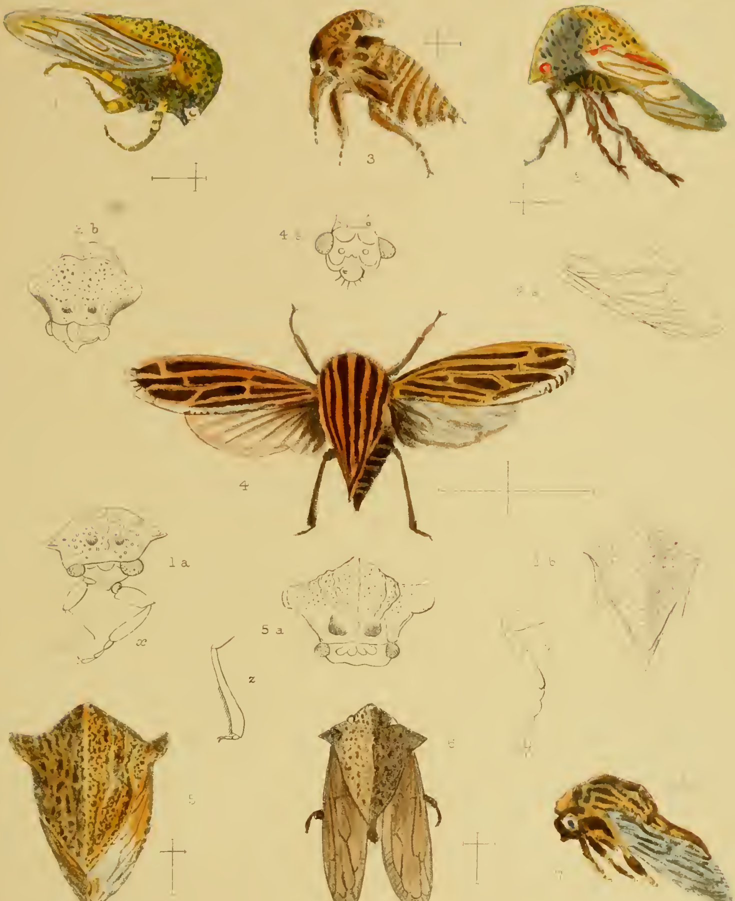
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PLATE XXI.

Fig. 1. *Platycotis tuberculata*, the female, page 100.

Fig. 1*a*. The male insect, without the porrect horn.

Fig. 1*b*. The head and metopidium.

Fig. 1*c*. The first and third legs with unequal sized tarsi.

Fig. 2. *Platycotis sicula*, page 100.

Fig. 2*a*. The head with its erect horn.

Fig. 3. *Platycotis affinis*, the male, page 103.*

Fig. 3*a*. The female of the same insect.

Fig. 3*b*. The front view of the head.

Fig. 3*c*. The tegmen of the male.

Fig. 3*c*♀. The same of the female. For more easy comparison this last figure should have been inverted.

Fig. 4. *Ochropepla pallens*. The pronotum, which partially covers the abdomen, may be noted, page 102.

Fig. 5. *Potnia brevicornis*, page 104.

Fig. 5*a*. A variety of the same insect (?).

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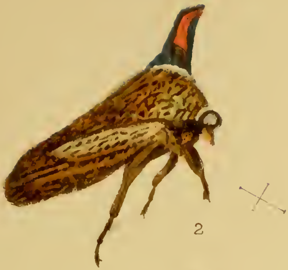
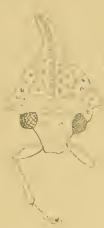
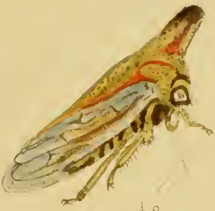
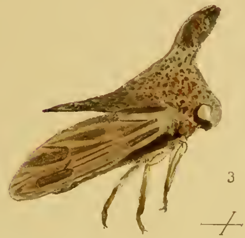
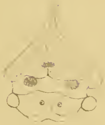
* By an error in the text, Figs. 3 are named under the genus *Potnia*. Their true place is as here given.

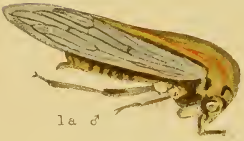


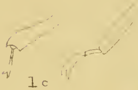


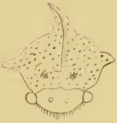


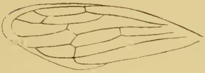


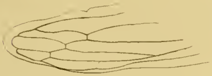


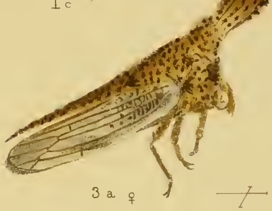


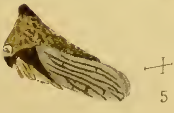


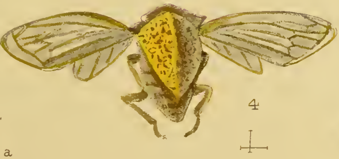


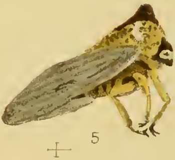












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West, Newman imp.

PLATE XXII.

Fig. 1. *Ochropepla corrosa*, page 102.

Fig. 1*a*. Head and metopidium.

Fig. 1*b*. Pronotum and part of the head by the back view.

Fig. 2. *Ochropepla inæqualis*, relative size, page 103.

Fig. 3. *Aspona bullata*, page 109.

Fig. 3*a*. Front view with the fore leg.

Fig. 3*b*. Tegmen and wing of the same insect.

Fig. 4. *Darnis partita*, page 112.

Fig. 4*a*. The tegmen.

Fig. 5. Variety of *Darnis partita*.

Fig. 5*a*. The frons, proboscis, and metopidium.

Fig. 6. *Darnis suturalis*, page 112.

Fig. 6*a*. Frons and fore leg.

Fig. 6*b*. Tegmen of the same insect.

Fig. 7. *Darnis limax*, page 112.

Fig. 7*a*. Dorsal view of the same.

Fig. 7*b*. Head and part of the pronotum.

Fig. 8. *Darnis lateralis*, page 113.

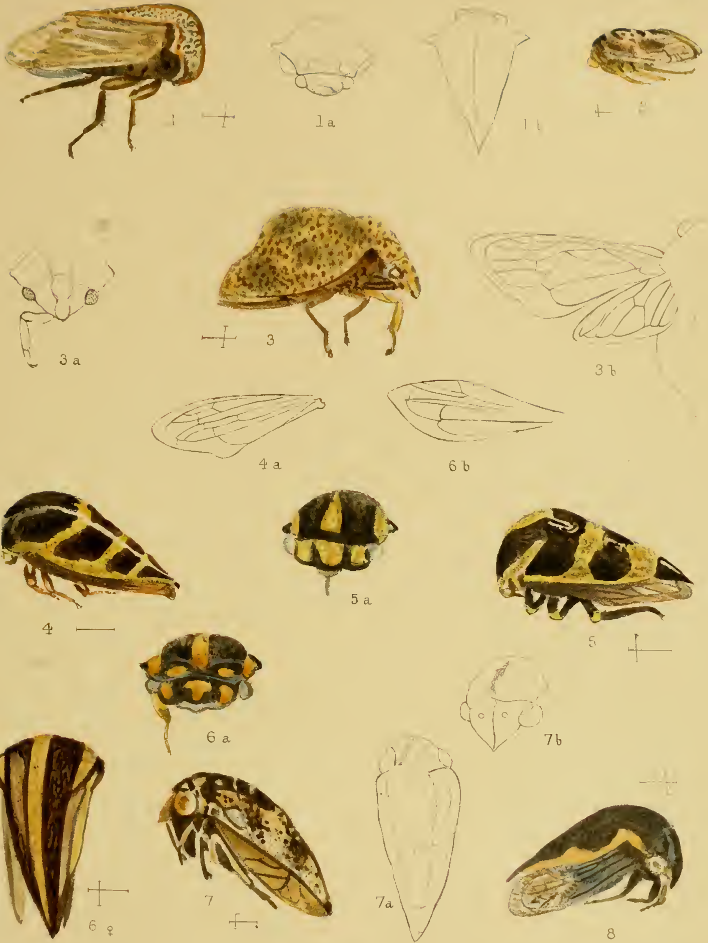
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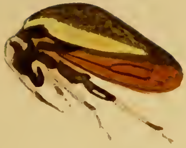
PLATE XXIII.

Fig. 1. *Darnis flaviceps*, ♂, page 113.
Fig. 1*a*. The head and the metopidium.
Fig. 2. *Darnis flaviceps*, the ♀, with spread wings.
Fig. 3. *Darnis flaviceps*, var. ? ♀, page 113.
Fig. 3*a*. The dorsal view.
Fig. 3*b*. The head and metopidium.
Fig. 4. *Stictopelta lineifrons*, page 116.
Fig. 4*a*. Head seen by the front view.
Fig. 5. *Stictopelta nigrifrons*, page 117.
Fig. 6. *Stictopelta indeterminata*, page 117.
Fig. 7. *Stictopelta acutula*, page 117.
Fig. 8. *Hebeticoides acutus*, page 119.
Fig. 8*a*. Head and metopidium and fore-legs.

PLATE XXIII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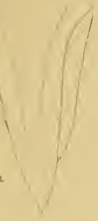
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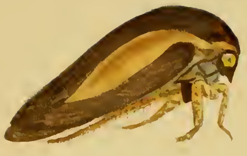
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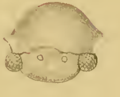
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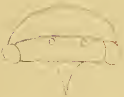
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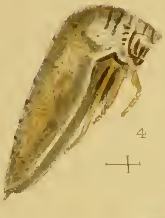
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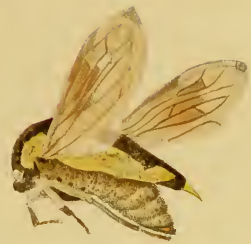
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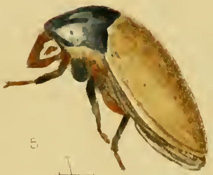
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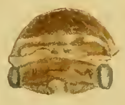
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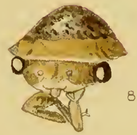
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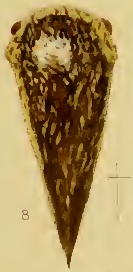
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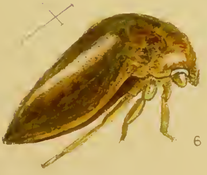
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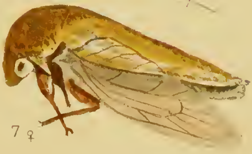
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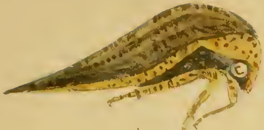
PLATE XXIV.

Fig. 1. *Hebetica convoluta*, page 119.
Fig. 2. *Stictopelta olivacea* (*cryptoptera*), page 118.
Fig. 2*a*. Tegmen of the same insect.
Fig. 3. *Stictopelta varians*, page 118.
Fig. 3*a*. Dorsal view of the pronotum.
Fig. 3*b*. Head and metopidium.
Fig. 4. *Tropidarnis pellicolor*, page 114.
Fig. 4*a*. Head and dorsal ridge of the pronotum.
Fig. 4*b*. Dorsal aspect of the same.
Fig. 5. *Tropidarnis robustus*, page 114.
Fig. 5*a*. Head and metopidium.
Fig. 5*b*. Dorsal view.
Fig. 6. *Alcmeone centrotoides*, page 110.
Fig. 6*a*. Head and supra-humeral processes.
Fig. 6*b*. Pronotum by the dorsal view.

PLATE XXIV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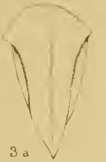
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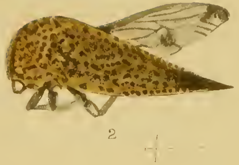
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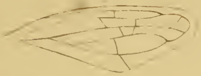
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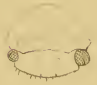
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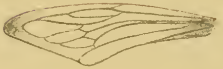
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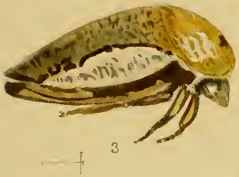
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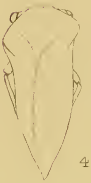
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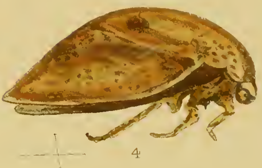
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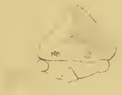
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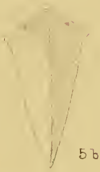
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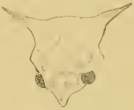
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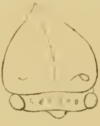
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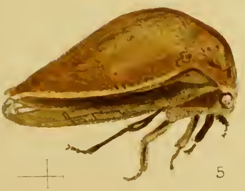
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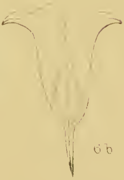
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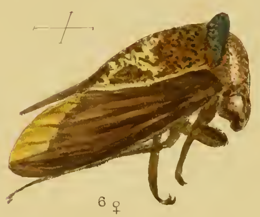
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PLATE XXV.

Fig. 1. *Hyphinöe marginalis*, page 120.
Fig. 1*a*. Head and metopidium.
Fig. 2. *Hyphinöe asphaltina*, page 120.
Fig. 2*a*. The front aspect showing no suprahumerals.
Fig. 2*b*. The tegmen with simple neuration.
Fig. 3. *Hyphinöe maculata*, page 121.
Fig. 3*a*. Head with short suprahumeral processes.
Fig. 4. *Hyphinöe globiceps*, page 121.
Fig. 4*a*. The head and metopidium.
The tips of the suprahumerals appear as black shining points only by the side view.
Fig. 5. *Hyphinöe tau*, page 122.
Fig. 5*a*. The remarkable hammer-headed form of the pronotum suggests the specific name.
Fig. 5*b*. The front aspect.
Fig. 6. *Hyphinöe subfusca*, page 122.
Fig. 6*a*. The front view of the metopidium.

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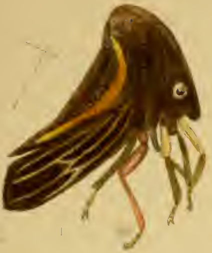
PLATE XI.



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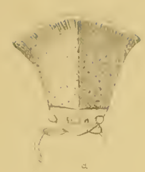

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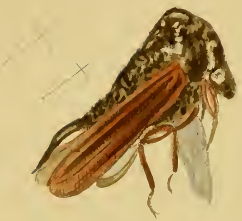

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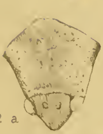

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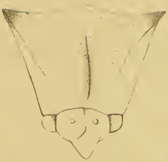

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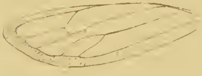

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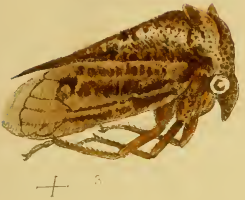

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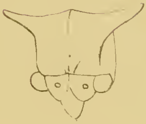

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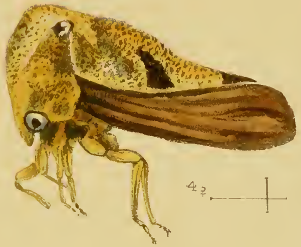

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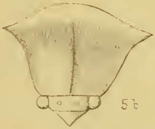

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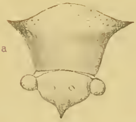

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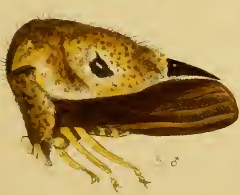
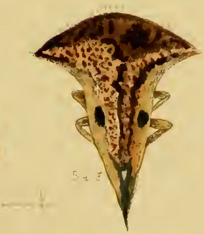


5 ♂



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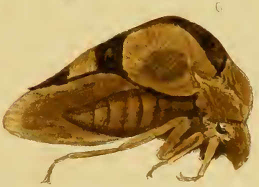

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PLATE XXVI.

Fig. 1. *Hyphinöe bigutta*, page 123.

Fig. 1*a*. The dorsal view of the insect. The breadth between the shoulders may be noted.

Fig. 2. *Hyphinöe purulensis*, page 123.

Fig. 2*a*. The length and narrowness of the dorsum may be contrasted with the last species.

Fig. 3. The tegmen of *H. asphaltina*. The type of the above genus. See Plate XXV.

Fig. 4. *Darnoides affinis*, page 126.

Fig. 5. *Dysyncritus intectus*, page 127.

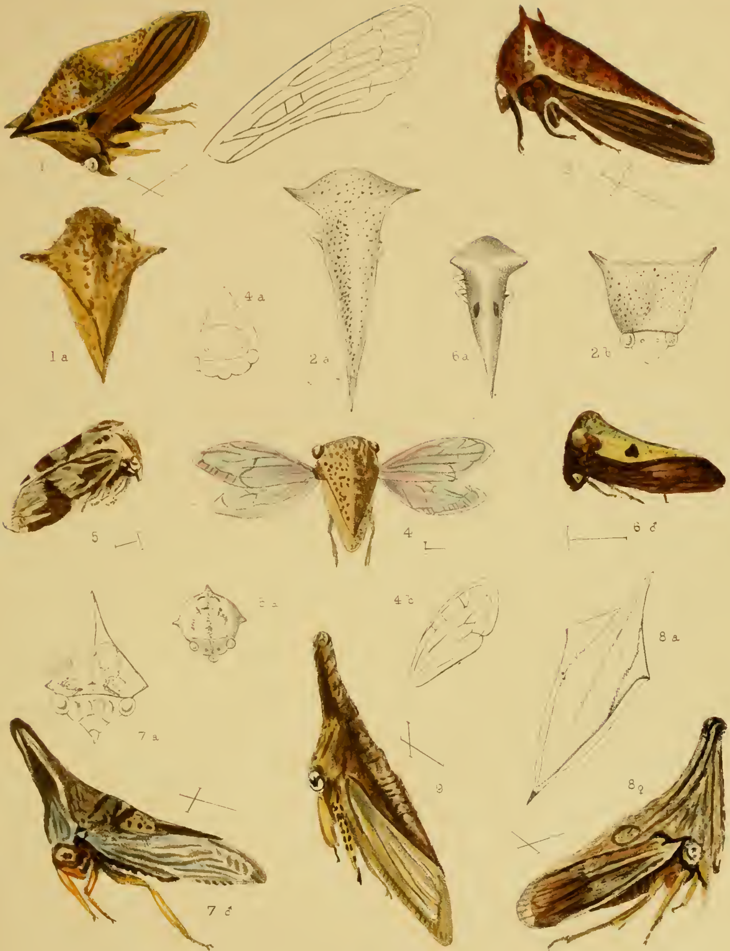
Fig. 6. A small variety of *Hyphinöe purulensis*, page 123.

Fig. 7. *Aconophora mexicana*, page 128.

Fig. 8. Female of the same.

Fig. 8*a*. The dorsal aspect.

Fig. 9. *Aconophora pubescens*, page 128.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5 a
4 b
8 a
7 a
9
8 ♀
7 ♂

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West Newman imp

PLATE XXVII.

Fig. 1. *Aconophora pubescens*, page 128.
The dorsal aspect does not show the legs.

Fig. 2. *Aconophora flavipes*, page 128.

Fig. 2*a*. The tegmen and wing.

Fig. 2*b*. The first, second, and third legs.

Fig. 3. *Aconophora marginata*, ♂, page 128.

Fig. 4. *Aconophora marginata*, ♀, page 129.

Fig. 4*a*. The front view with the horn.

Fig. 5. *Aconophora laticornis*, ♂, page 129.

Fig. 5*a*. The dorsal aspect with narrow horn.

Fig. 6. The female of the same insect with the broad horn.

Fig. 7. *Aconophora quadrivittata*, page 130.

Fig. 7*a*. The pronotum seen in the profile.

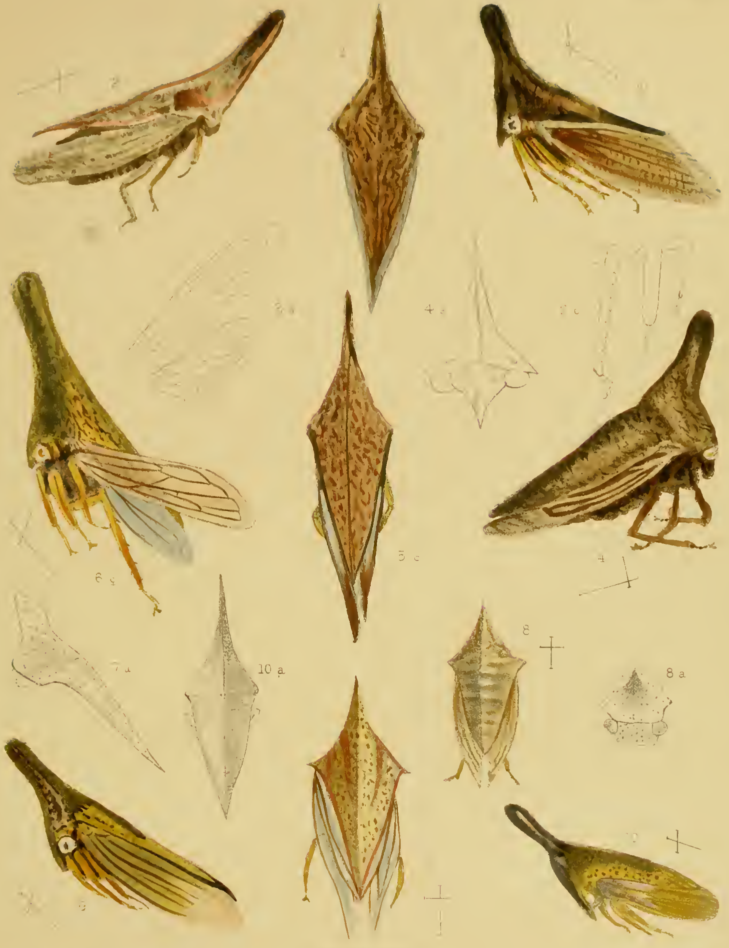
Fig. 8. *Aconophora viridula*, page 130.

Fig. 8*a*. The head and metopidium.

Fig. 9. *Aconophora punguis*, page 131.

Fig. 10. *Aconophora ensata*, page 131.

Fig. 10*a*. The back view of the same insect.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8
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PLATE XXVIII.

0 Fig. 1. *Aconophora disparicornis*, ♂, page 131.

0 Fig. 2. *Aconophora nitida*, page 132.

0 Fig. 2*a*. Head and metopidium.

0 Fig. 4. *Aconophora caliginosa*, page 132.

0 Fig. 4*a*. The head and metopidium.

0 Fig. 5 *Aconophora W. album*, page 132.

0 Fig. 5*a*. The profile view of the pronotum and part of the head.

0 Fig. 6. *Entaphinus funebris*, page 134.

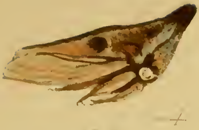
Fig. 6*a*. The front view of the pronotum.

Fig. 6*b*. The tegmen.

Fig. 3. *Hyphinöe punctorum*, page 124.

Fig. 3*a*. The head with the supra-humeral horns.

N.B.—To economise the space of this plate, this last species is unavoidably drawn away from its genus figured on Plate XXV.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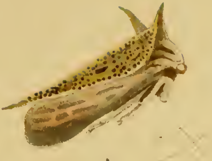
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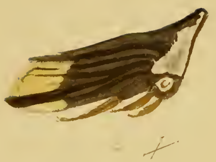
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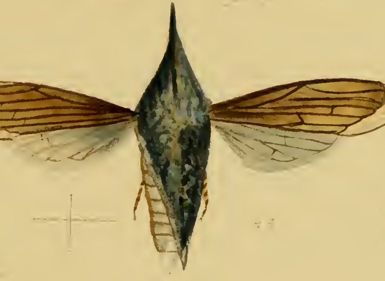
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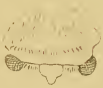
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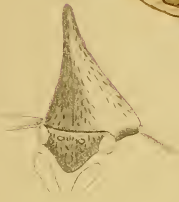
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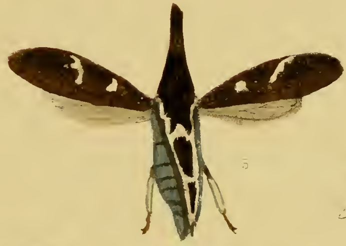
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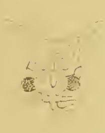
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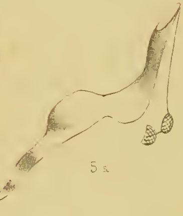
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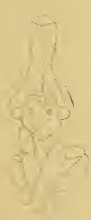
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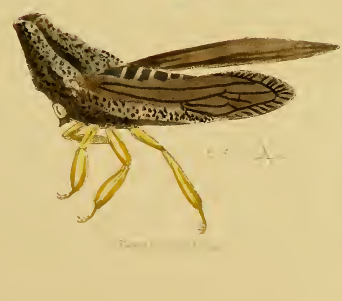
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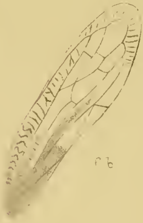
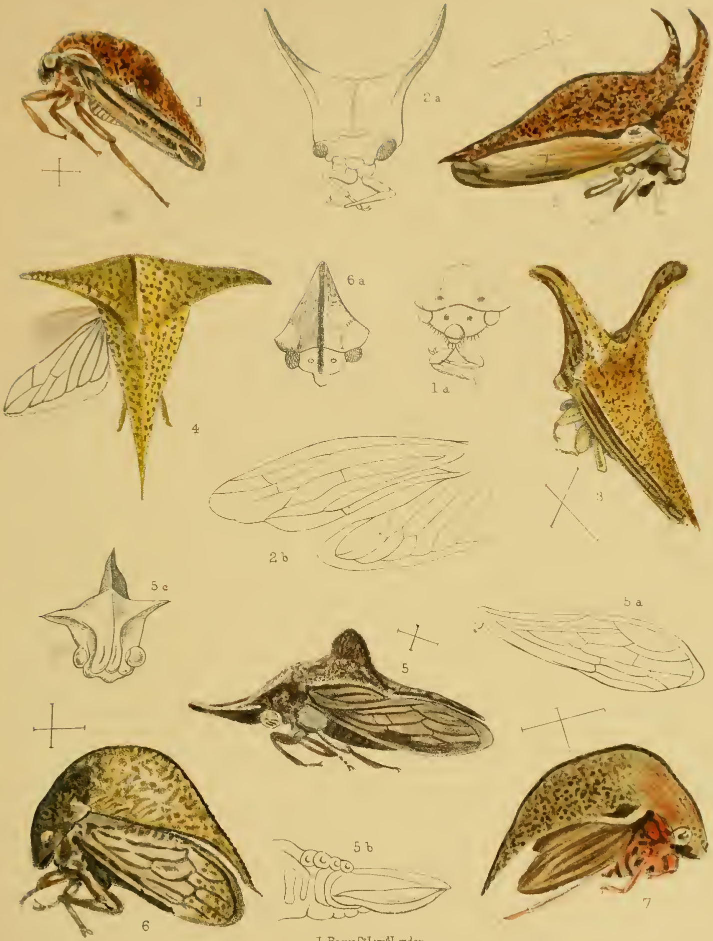

6 b

PLATE XXIX.

Fig. 1. *Hypheus albopicta*, page 135.
Fig. 1*a*. Frons and short metopidium.
Fig. 2. *Hemiptycha marginata*, page 136.
Fig. 2*a*. The frons and curved suprahumerals.
Fig. 2*b*. Tegmen and wing.
Fig. 3. *Hemiptycha spatulosa*, page 137.
Fig. 4. *Hemiptycha flava*, and wing, page 137.
Fig. 5. *Nessorhinus vulpes*, page 138.
Fig. 5*a*. Tegmen of the same.
Fig. 5*b*. Abdominal valves of the female.
Fig. 5*c*. Head, suprahumerals, and part of the dorsal horn.
Fig. 6. *Cymbomorpha vaginata*, page 139.
Fig. 6*a*. Head and metopidium.
Fig. 7. *Cymbomorpha rubropedalis var.* (Dr. Aurivillius.)

PLATE XXIV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7

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G B B del. ad nat.

West, Newman imp.

PLATE XXX.

Fig. 1. *Heteronotus vulnerans*. The two suprahumeral spines may be noted, one of them over the tegmen, page 141.

Fig. 2. *Heteronotus fowleri*, page 141. The winged adult insect.

Fig. 2*a*. A smaller specimen in profile, showing the overhanging pronotum, and the abdomen.

Fig. 2*b*. The head and metopidium.

Fig. 3. *Heteronotus inermis*, page 142.

Fig. 3*a*. The last abdominal joint.

Fig. 4. *Heteronotus nigricans*, page 142.

Fig. 4*a*. The same seen from the underside.
The ant-like imitation may be seen.

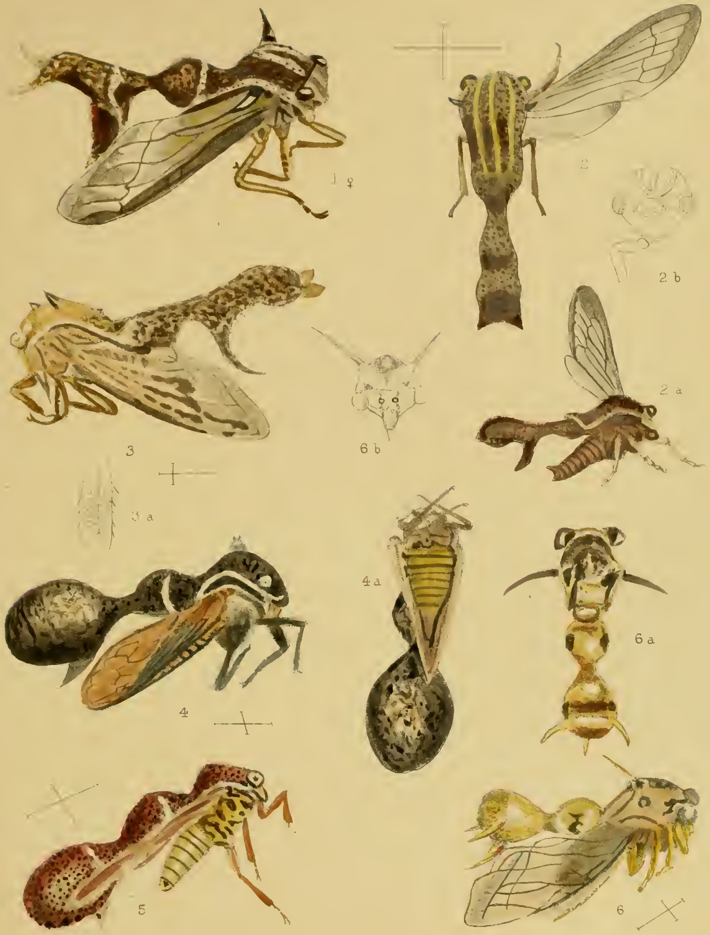
Fig. 5. *Heteronotus glanduligera*, page 142.

Fig. 6. *Heteronotus strigosa*, page 143.

Fig. 6*a*. The dorsal view with the two suprahumerals.

Fig. 6*b*. The head and frons.

PLATE XXX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West, Newman imp

PLATE XXXI.

Fig. 1. *Combophora beskii.* The side view, showing its coccinella-like appearance. page 145.

Fig. 1*a*. The back view of the same, and showing the neuration of the tegmen.

Fig. 1*b*. The front view of the same insect.

Fig. 1*d*. The hind leg and tarsus.

Fig. 1*c*. The underside.

Fig. 2. A white variety (?) of *C. beskii*, page 145.

Fig. 2*a*. The head and antennæ.

Fig. 3. *Combophora laporti*, page 146.

Fig. 5. *Combophora tridens*, page 146.

Fig. 5*a*. A variety of the same.

Fig. 6. *Combophora consentanea.* The dorsal aspect, page 146.

Fig. 7. *Combophora obfuscata*, page 147.

Fig. 7*a*. Dorsal view showing the concave form of the tegmina.

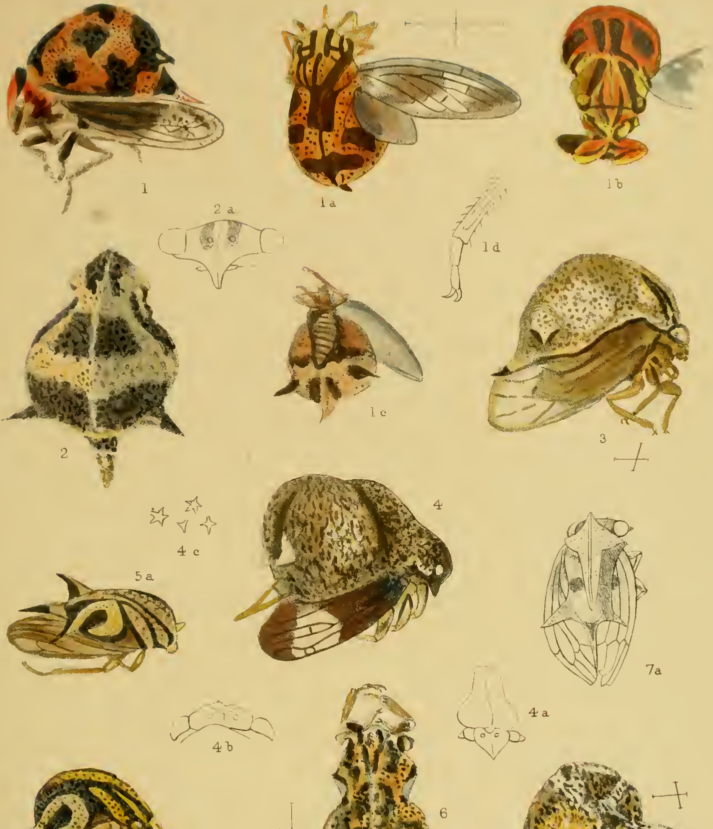
Fig. 4. *Anchistrotus obesus*, page 147.

Fig. 4*a*. The head and metopidium.

Fig. 4*b*. The dorsal view of the head and eyes.

Fig. 4*c*. Highly magnified view of the stellate patches on the pronotum.

PLATE XXXI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G.B.B. del. ad nat.

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West, Newman imp

PLATE XXXII.

Fig. 1. Pronotum of the *Combophora laporti*, seen in perspective, showing the concave form of the sides and the dorsal ridge, page 146.

Fig. 2. Back view of *Anchistrotus obesus*, showing the positions of some of the stellate punctures on the pronotum, page 147.

Fig. 3. Tegmen of *Combophora laporti*, page 146.

Fig. 4. Tegmen of *Combophora consentanea*, page 146.

Fig. 5. Tegmen of *Heteronotus*, page 141.

Fig. 6. Tegmen of *Combophora obfuscata*, page 146.

Fig. 7. Frons of *Anchistrotus obesus*, page 147.

Fig. 8. *Horiola arcuata*. Very shining; the white streak is reflected light, page 158.

Fig. 9. *Horiola picta*, page 158.

Fig. 9*a*. Profile view of the same insect.

Fig. 9*b*. Head and frons.

Fig. 10. *Tragopa insignis*, page 155.

Fig. 10*a*. Side view of the same (♀ with ovipositor?)

Fig. 11. *Parmula distinguenda*, page 161.

Fig. 11*a*. Front view of head.

Fig. 12. *Parmula reticulata*, page 161.

Fig. 12*a*. Variety of the same.

Fig. 13. *Tragopa bugabensis*, page 156.

Fig. 14. *Hypamastris segmentata*, page 162.

Fig. 14*a*. Head and frons.

Fig. 14*b*. Tegmen and wing of the same.

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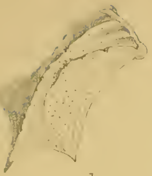
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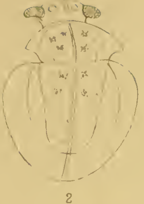
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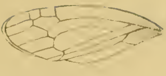
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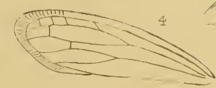
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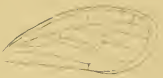
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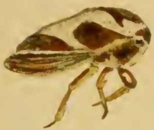
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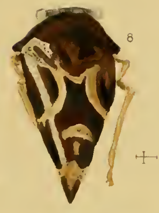
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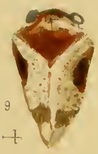
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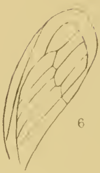
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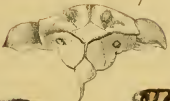
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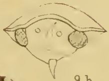
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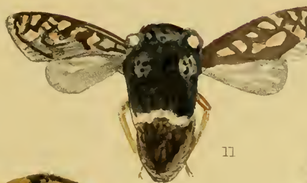
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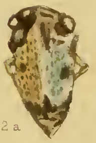
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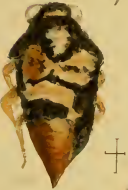
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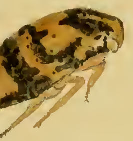
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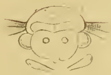
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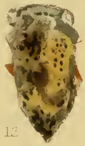
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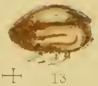
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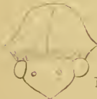
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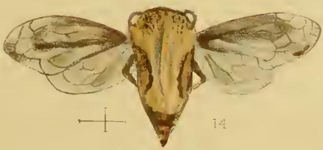
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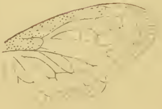
14 b

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PLATE XXXIII.

Fig. 1. *Tragopa scutellaris*, page 156.

Fig. 1*a*. The dorsal aspect.

Fig. 2. *Chelyoides nitida*, page 156.

Fig. 2*a*. The front of the insect showing the lobes or flaps of the pronotum.

Fig. 2*b*. The underside with the flaps, the rostrum and legs.

Fig. 2*c*. The front legs magnified.

Fig. 3. *Cyphonia trifida* ♀, page 164.

Fig. 3*a*. The pronotum.

Fig. 3*b*. The apex of the abdomen.

Fig. 4. *Cyphonia trifida*, the ♂, with expanded wings.

Fig. 5. *Cyphonia clavata*. The neuration of the wings appears to be more complex than that shown by the last species, page 164.

Fig. 6. *Cyphonia clavigera*, page 165.

Fig. 7. *Cyphonia fuscata*, page 165.

Fig. 7*a*. Dorsal view of the same.

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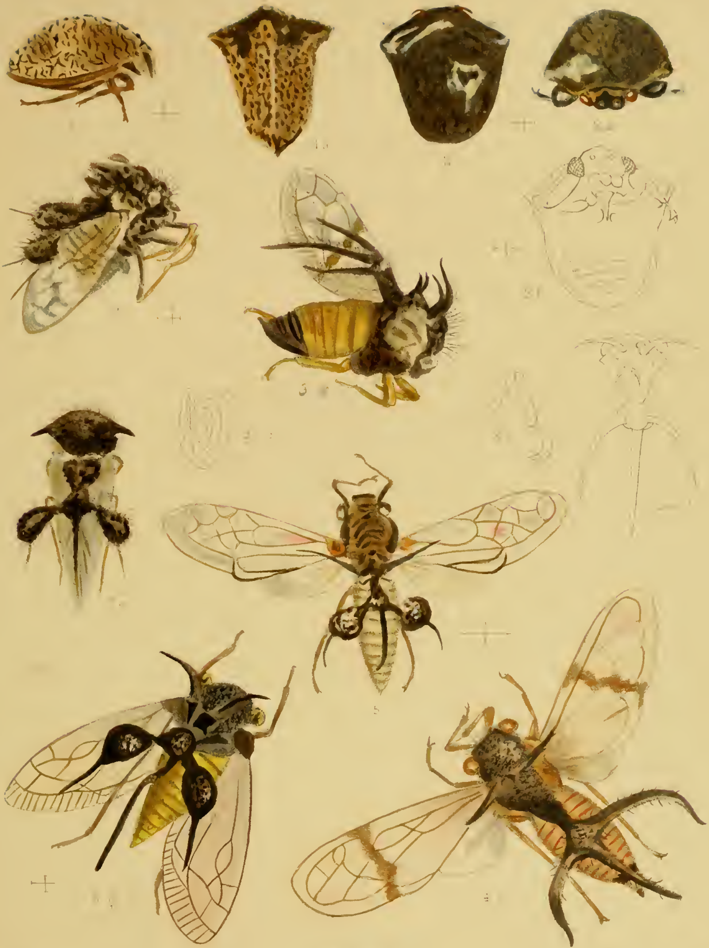

L. Reeve & C° Lith. London

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PLATE XXXIV

Fig. 1. *Cyphonia jugalis*, page 165.
Fig. 1*a*. Dorsal view of the same insect.
Fig. 2. *Poppea setosa*, page 166.
Fig. 2*a*. Head with the blunt suprahumerals.
Fig. 2*b*. The pronotum and legs.
Fig. 3. *Poppea capricornis*, page 166.
Fig. 3*a*. The pronotum with its spinous processes.
Fig. 3*b*. The head and suprahumerals.
Fig. 4. *Poppea munda*, page 167.
Fig. 4*a*. The pronotum and its armatures.
Fig. 4*b*. The head and frons.
Fig. 5. *Poppea concinna*, page 167.
Fig. 6. *Poppea rectispina*. The legs in the specimen were defective, page 167.
Fig. 6*a*. Back view of the pronotum.
Fig. 6*b*. Head and suprahumerals.
Fig. 7. *Poppea subrugosa*. The tarsi are often difficult to define. Sometimes they may appear as if trimerous, page 168.

PLATE XXXV

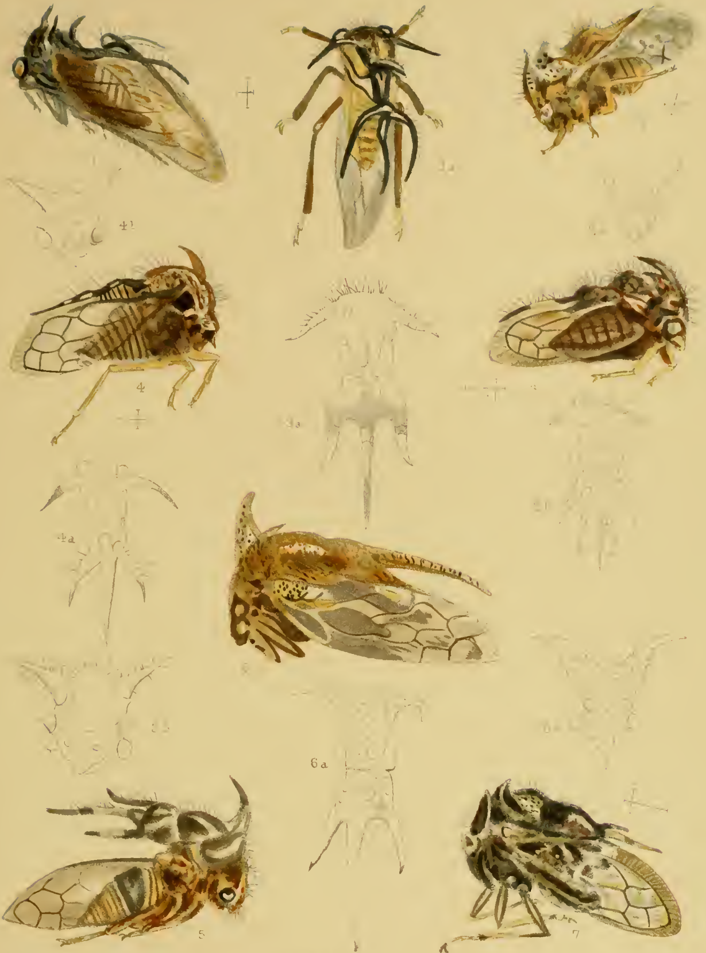
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PLATE XXXV.

Fig. 1. *Ceresa axillaris*, page 169.
Fig. 1*a*. The dorsal view of the pronotum.
Fig. 2. *Ceresa dicera*, ♀, page 169.
Fig. 2*a*. The head and suprahumerals.
Fig. 3. *Ceresa dicera*, ♂, page 169.
Fig. 3*a*. The pronotum.
Fig. 4. *Ceresa bubalus*, page 170.
Fig. 4*a*. Head and frons.
Fig. 5. *Ceresa variabilis*, page 170.
Fig. 5*a*. Head and metopidium.
Fig. 6. *Ceresa minor* (?) var. *vitulus*, page 171.
Fig. 6*a*. Head with short suprahumerals.
Fig. 7. *Ceresa dubia*, page 171.
Fig. 8. *Ceresa vitulus*, page 171.
Fig. 8*a*. Tegmen with its neuration.

PLATE XXXV

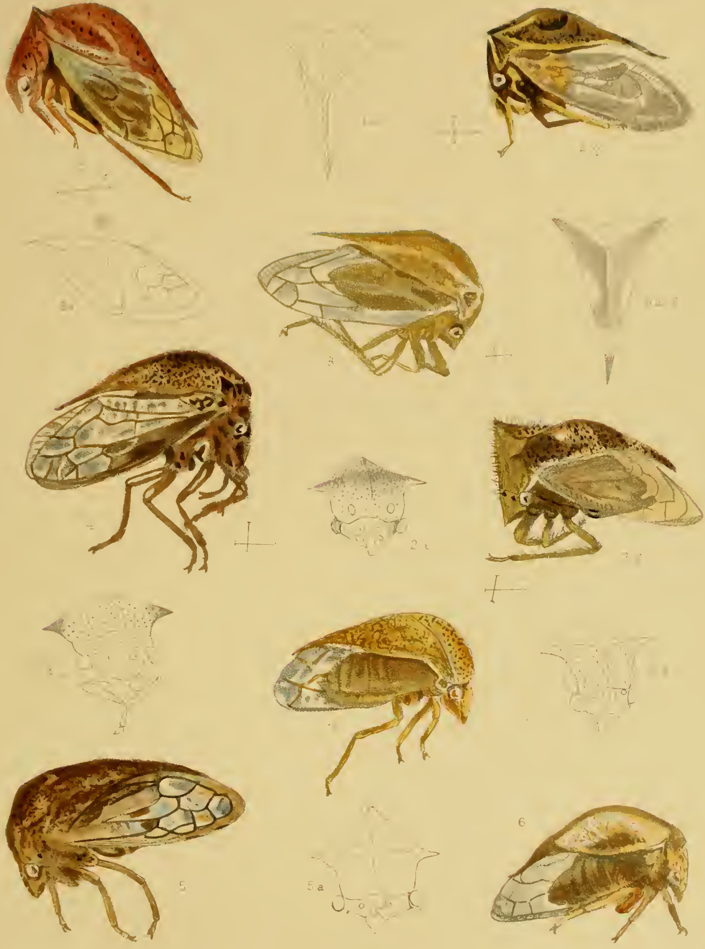

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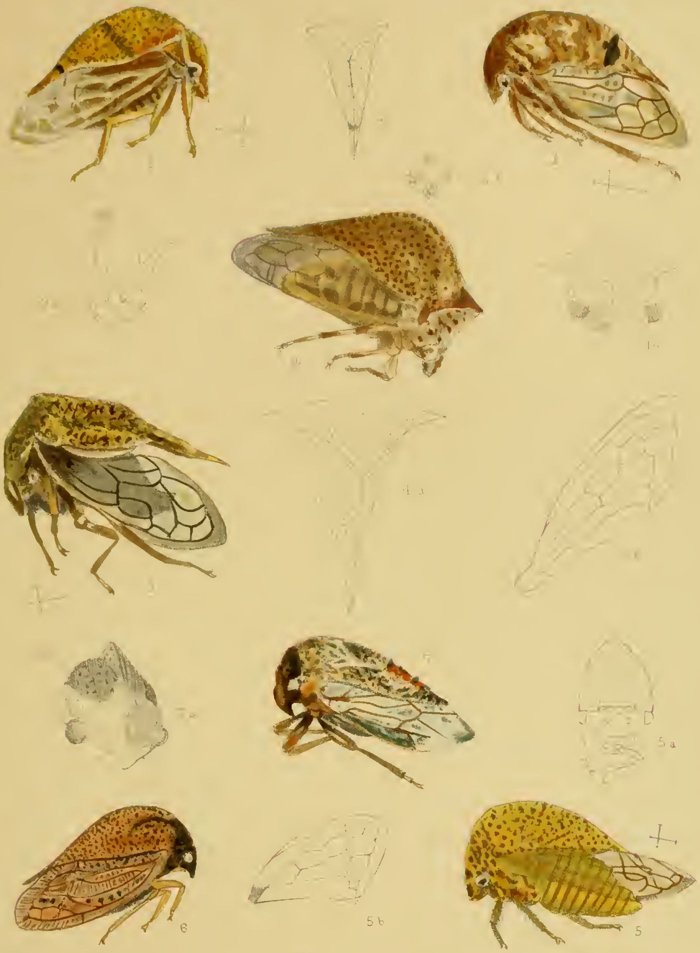
PLATE XXXVI.

Fig. 1. *Ceresa nigrovittata*, page 172.
Fig. 1*a*. Head and punctured metopidium.
Fig. 1*b*. White stellate punctures magnified.
Fig. 2. *Ceresa alta*, page 172.
Fig. 2*a*. Dorsal view of pronotum.
Fig. 3. *Ceresa nitidalis*, page 173.
Fig. 3*a*. Head and metopidium.
Fig. 3*b*. Tegmen with five apical areas.
Fig. 4. *Ceresa testacea*, page 173.
Fig. 4*a*. Pronotum of the same much punctured.
Fig. 5. *Stictocephala inermis*, page 174.
Fig. 5*a*. Head and frons.
Fig. 5*b*. Tegmen, possibly a little too much fore shortened.
Fig. 6. *Stictocephala semibrunneata*, page 174.
Fig. 7. *Centrogonia maculata*, page 174.
Fig. 7*a*. Head and unarmed metopidium.



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L. Reeve & C^o. L^td. London

West Newman imp.

PLATE XXXVII.

Fig. 1. *Phacusa variata*, page 175.
Fig. 1*a*. Head and frons.
Fig. 2. *Eurytea fasciata*, page 175.
Fig. 2*a*. Shining head and frons.
Fig. 3. *Eurytea capitata*, page 175.
Fig. 3*a*. Front view of head and the dorsal ridge.
(See Plate XXXVIII. fig. 2.)
Fig. 4. *Acutalis nigrinervis*, page 176.
Fig. 4*a*. The dorsal aspect of the same.
Fig. 5. *Acutalis flavoneurosa*, page 176.
Fig. 6. *Acutalis lucidus*, page 177.
Fig. 6*a*. Head and frons.
Fig. 6*b*. Wing of the same.
Fig. 7. *Micrutalis balteata*, page 177.
Fig. 7*a*. The dorsal view of the insect.
Fig. 7*b*. The head and frons.
Fig. 8. *Micrutalis pallens*, page 178.
Fig. 8*a*. The tegmen and wing.
Fig. 9. *Micrutalis binuria*, page 178.
Fig. 10. *Micrutalis stipulipennis*, page 178
Fig. 10*a*. The profile view.
Fig. 10*b*. The head and frons.

PLATE XXXVII

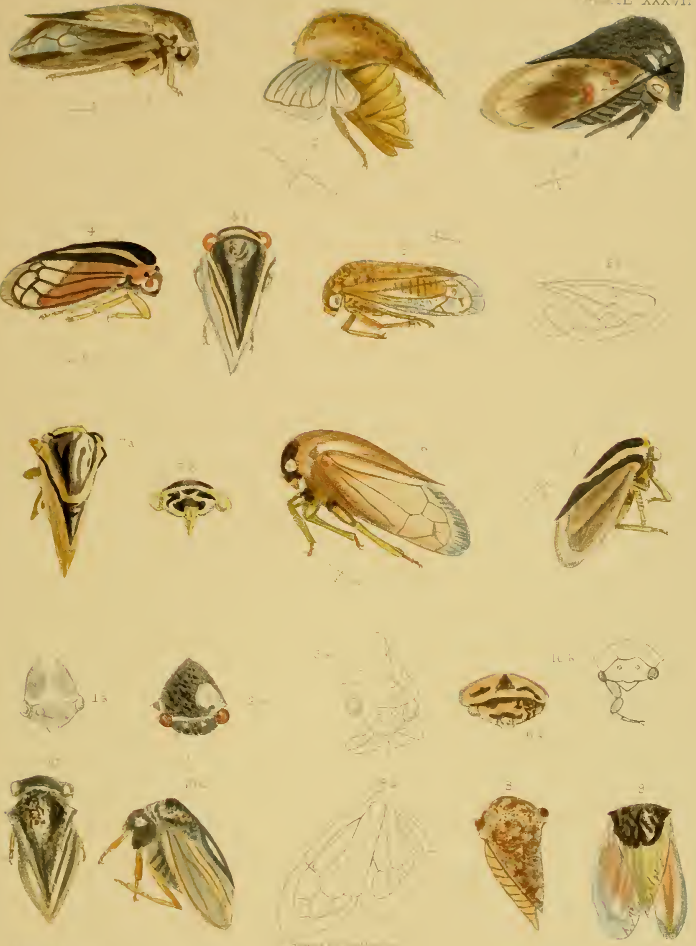
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PLATE XXXVIII.

Fig. 1. *Trachytalis isabellina*, page 179.
Fig. 1*a*. The dorsal view.
Fig. 1*b*. The head and frons.
Fig. 1*c*. The tegmen and the wing.
Fig. 2. *Eurytea capitata*, showing the neuration.
(See Plate XXXVII. fig. 3*a*.)
Fig. 3. *Polyglypta maculata*, page 180.
Fig. 3*a*. The tegmen and the wing.
Fig. 3*b*. The abdomen seen from below, enclosed between the tegmina.
Fig. 4. *Polyglypta strigata*, page 180.
Fig. 4*a*. The tegmen and wing.
Fig. 4*b*. The head and horn of the same.
Fig. 4*c*. The fore and hind legs.
Fig. 5. *Polyglypta dorsata*, page 181.
Fig. 6. *Polyglypta pallipes*, page 181.
Fig. 7. *Polyglypta costata*, page 181.
Fig. 8. *Polyglypta tricolor*, page 182.
Fig. 8*a*. The dorsal aspect.
Fig. 9. *Polyglypta bogotensis*, page 182.

PLATE XXXVIII

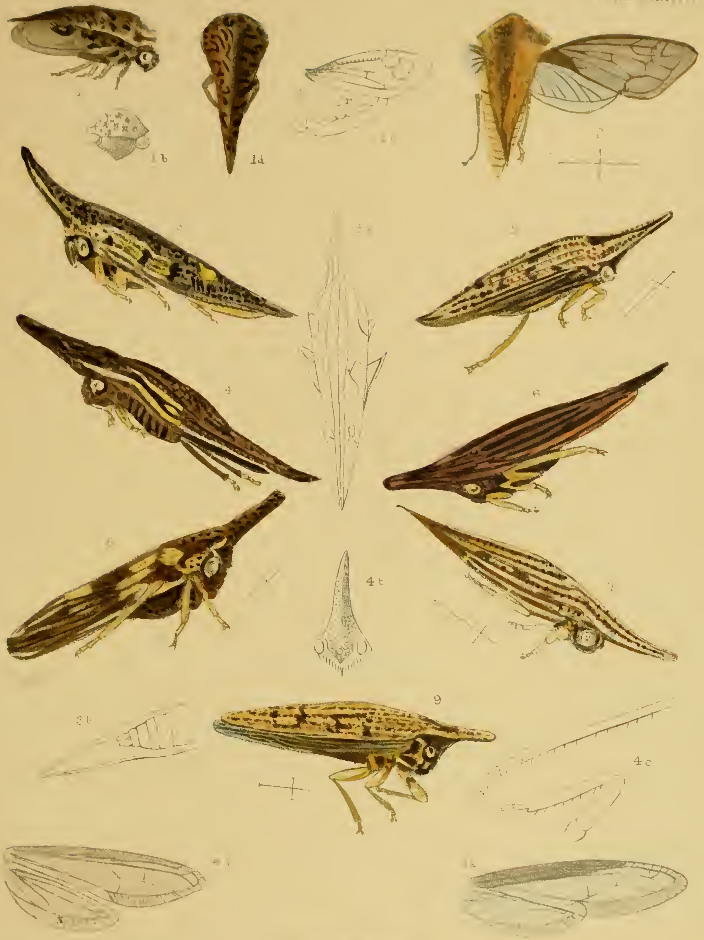
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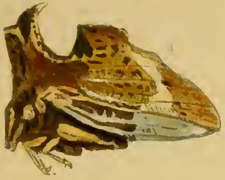
PLATE XXXIX.

Fig. 1. *Entylia sinuata*, page 183.
Fig. 2. *Entylia concisa*, page 183.
Fig. 2*a*. Head and metopidium.
Fig. 3. *Entylia Œdipus*, page 183.
Fig. 3*a*. Tegmen and wing.
Fig. 4. *Entylia concava*, page 184.
Fig. 4*a*. Head and frons.
Fig. 5. *Publilia grisea*, page 184.
Fig. 5*a*. Head and punctured frons.
Fig. 6. *Publilia vittata*, page 184.
Fig. 7.* *Publilia tumulata.*
Fig. 7*a*. Head and metopidum.
Fig. 8. *Metheisa cucullata*, page 186.
Fig. 9. *Metheisa lucillodes*, page 185.

* This species is omitted in the text. It is somewhat like *P. vittata*, but the dorsum is less tumid or humped, and it shows no white bands across the tegmina. These tegmina are hyaline towards their apices, with dark clouded borders. Size 9 × 5 mm.

PLATE XXXIX.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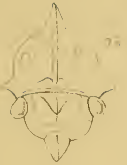

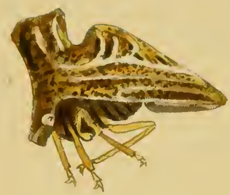

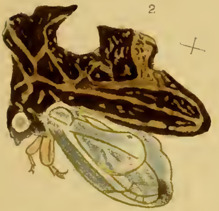
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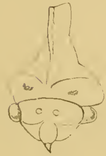
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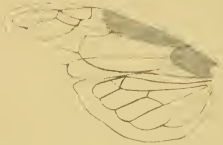

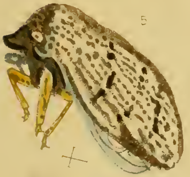
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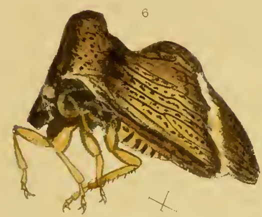
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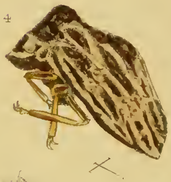
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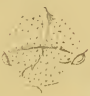
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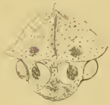
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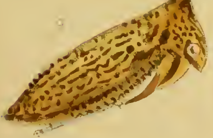

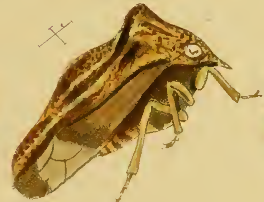

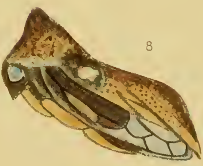
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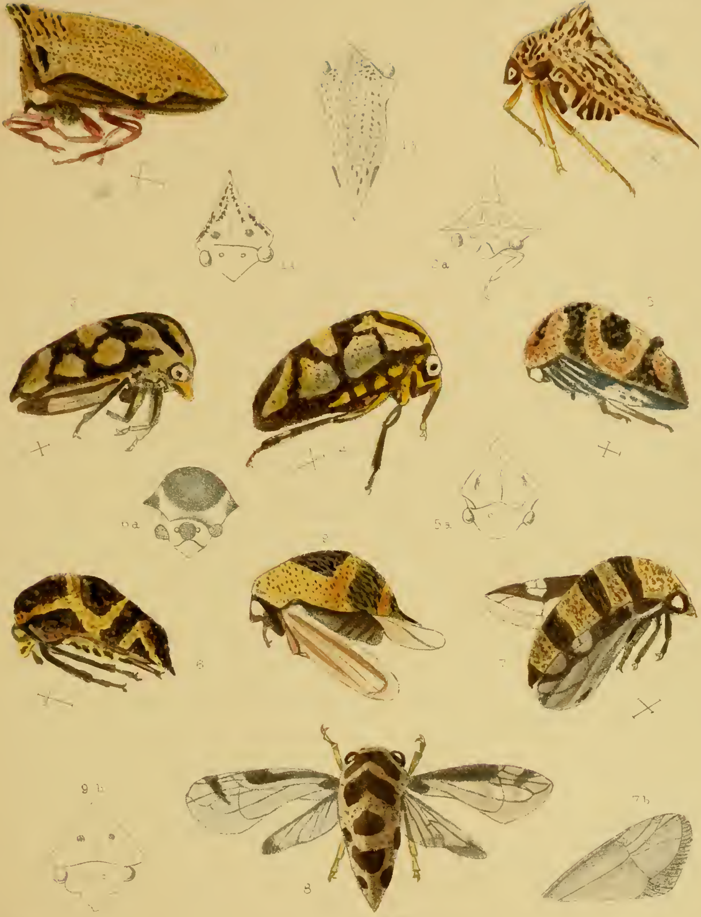
PLATE XL.

Fig. 1. *Metheisa sinuata*, page 186.
Fig. 1*a*. Head and frons.
Fig. 1*b*. Dorsal aspect.
Fig. 2. *Oxygonia accuminata*, page 187.
Fig. 2*a*. Head and frons.
Fig. 3. *Adippe zebrina*, page 188.
Fig. 4. *Adippe concinna* var., page 188.
Fig. 5. *Adippe ocellata*, page 188.
Fig. 5*a*. Head and metopidium.
Fig. 6. *Adippe testudo*, page 188.
Fig. 6*a*. Head and frons.
Fig. 7. *Adippe fasciata*. The bee-like form may be noted, page 189.
Fig. 7*a*. Head and frons.
Fig. 7*b*. The tegmen. Though dense, this is figured too dark.
Fig. 8. *Adippe pardalina*, page 189.
Fig. 9. *Argante semifasciatum*, the male, page 190.
(See Plate XLI. for the female).

PLATE XL.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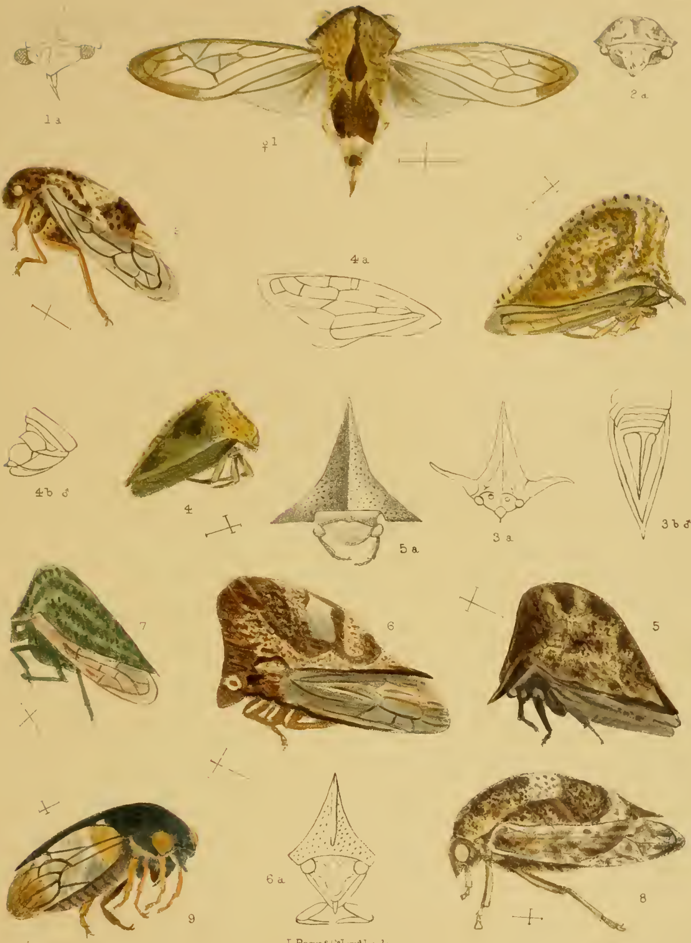
West Newman imp.

PLATE XLI.

Fig. 1. *Argante semifasciatum*, page 190.
Fig. 1*a*. The head and frons. (See Plate XL. fig. 9).
Fig. 2. *Godingia guerreroensis*, page 190.
Fig. 2*a*. Head and frons.
Fig. 3. *Antianthe expansa*, page 190.
Fig. 3*a*. The head and suprahumeral horns.
Fig. 3*b*. The genital armature ♀ (wrongly marked ♂ in the figure).
Fig. 4. *Antianthe humilis*, var., page 191.
Fig. 4*a*. The tegmen.
Fig. 4*b*. The genital armature ♂.
Fig. 5. *Antianthe foliacea*, page 191.
Fig. 5*a*. Head and front aspect of horns.
Fig. 6. *Antianthe compressa*, page 191.
Fig. 6*a*. Front view of head.
Fig. 7. *Antianthe viridissima*, page 191.
Fig. 8. *Cyrtolobus discoidalis*, page 192.
Fig. 9. *Gibbomorpha parvula*, page 192.

PLATE XLI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8

G.B.B. del

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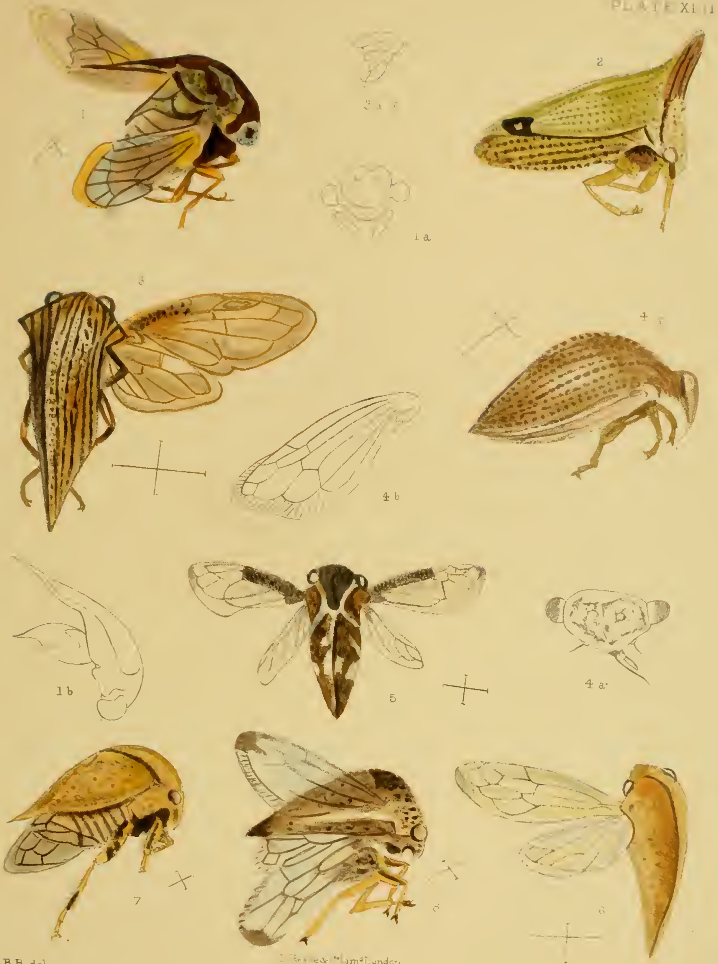
PLATE XLII.

Fig. 1. *Gibbomorpha aurea,* page 193.
Fig. 1*a*. Head and frons.
Fig. 1*b*. Pronotum and scutellum below.
Fig. 2. *Hille maculicornis,* page 193.
Fig. 3. *Thelia multoglypta* ♂, page 194.
Fig. 3*a*. The male genitalia.
Fig. 4. *Thelia multoplypta* ♀.
Fig. 4*a*. The head, eye, antennæ and rostrum.
Fig. 4*b*. The tegmen.
Fig. 5. *Publilia concava,* page 194. (See Plate XXXIX. fig. 4).
Fig. 6. *Atymna lineata,* winged, page 195
Fig. 7. *Stictocephala lutea,* page 195.
Fig. 8. *Stictocephala nervosa,* page 195.

PLATE XLII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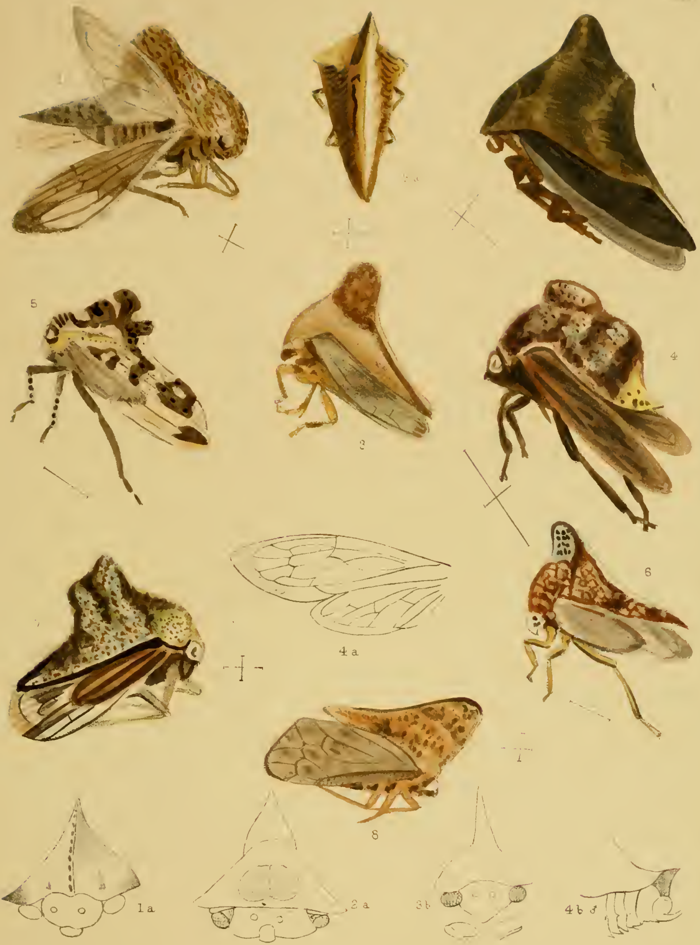
West Newman imp.

PLATE XLIII.

Fig. 1. *Telamona brunneipennis*, page 197.
Fig. 1*a*. Head with its punctured ridge.
Fig. 2. *Telamona gibba*, page 197.
Fig. 2*a*. Head with its broad metopidium, and short frons.
Fig. 3. *Telamona dorsalis*, page 197.
Fig. 3*a*. The dorsal aspect, with its white streak.
Fig. 3*b*. Head and frons.
Fig. 4. *Heliria anoflava*, page 198.
Fig. 4*a*. The tegmen and wing.
Fig. 4*b*. The male genitalia.
Fig. 5. *Telamona sinuata*, page 198.
Enlarged from the B.C.A.
Fig. 6. *Telamona albidorsata*, page 198.
Enlarged from the B.C.A.
Fig. 7. *Telamona turritella*, page 198.
Fig. 8. *Lycoderes capitata*, page 203.
(Plate XLIV. fig. 7. The head).

PLATE XLIII



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8
1 a
2 a
3 b
4 b ♂

G.B.B. del

L. Reeve & Co. Lmd. London

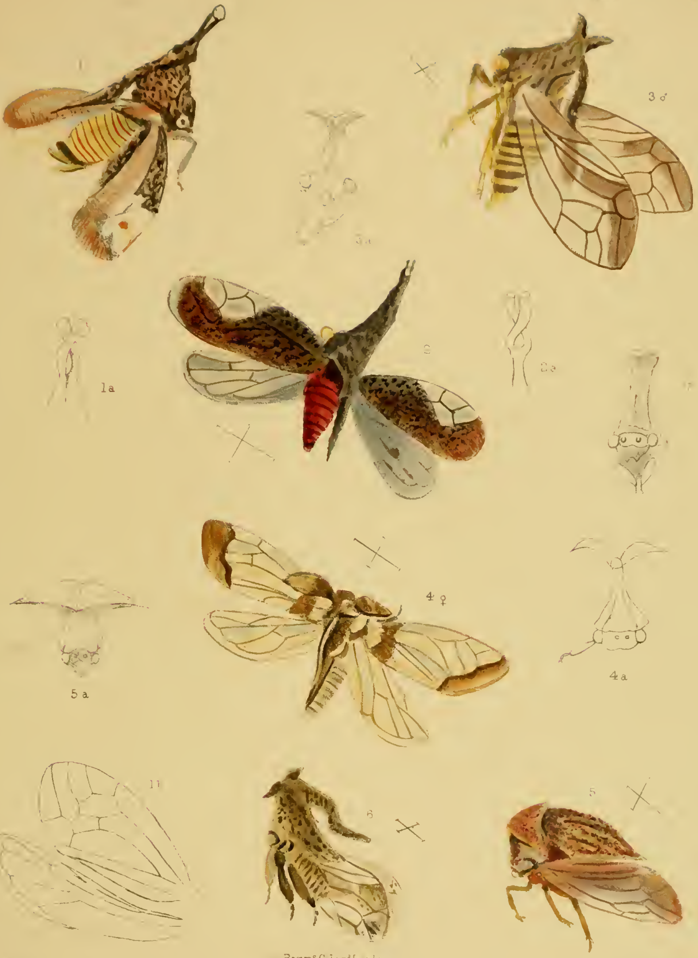
West Newman lith.

PLATE XLIV.

Fig. 1. *Lycoderes igniventer*, page 200.
Fig. 1*a*. The summit of the procephalic horn.
Fig. 1*b*. The tegmen and wing.
Fig. 2. *Lycoderes Burmeisteri*, page 200.
Fig. 2*a*. Summit of the cephalic process.
Fig. 3. *Lycoderes angustata*, page 201.
Fig. 3*a*. Head and adjuncts. The form of the dorsal process may be noted.
Fig. 4. *Lycoderes furca*, ♀, page 201.
Fig. 4*a*. The head and procephalon.
Fig. 5. *Lycoderes mitratus*, page 202.
Fig. 5*a*. Front aspect with its hammer-like process, which is broadly extended backwards.
Fig. 6. *Lycoderes torta*, page 202.
Fig. 7. Head of *Lycoderes capitata*, page 203.

N.B.—All separate figures in outline representing neuration, are more reliable than those shown in the coloured examples, which may become obscure by the perspective, or the glance of light.

PLATE XLIV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G.B.B. del
Reeve & C. Lim^d London
West Newman lith.

PLATE XLV.

Fig. 1. *Lycoderes truncatulis.* The tegmina are very dense. The spatulate legs may be noted, page 203.

Fig. 2. *Lycoderes serraticornis,* with the expanded tip, page 203.

Fig. 2*a.* The serrated procephalon.

Fig. 3. *Œda informis,* page 206.

Fig. 3*a.* The insect seen in perspective. The small bulb at the summit of the procephalon recalls the similar bulb seen in some Fulgoridæ.

Fig. 3*b.* Posterior perspective view of the pronotum.

Fig. 4. *Œda inflata,* ♂, page 206.

Fig. 4*a.* Front view of the pronotum, but seen partly from below. The fore apex is cleft at the summit as is Lycoderes.

Fig. 5. *Œda frondosa,* page 206.

Fig. 5*a.* The same, showing the flattened form of the dorsum. This figure is of the natural size.

Fig. 5*b.* Underside, showing the valves of the female insect.

Fig. 6. *Bocydium tintinnabuliferum,* ♂, page 208.

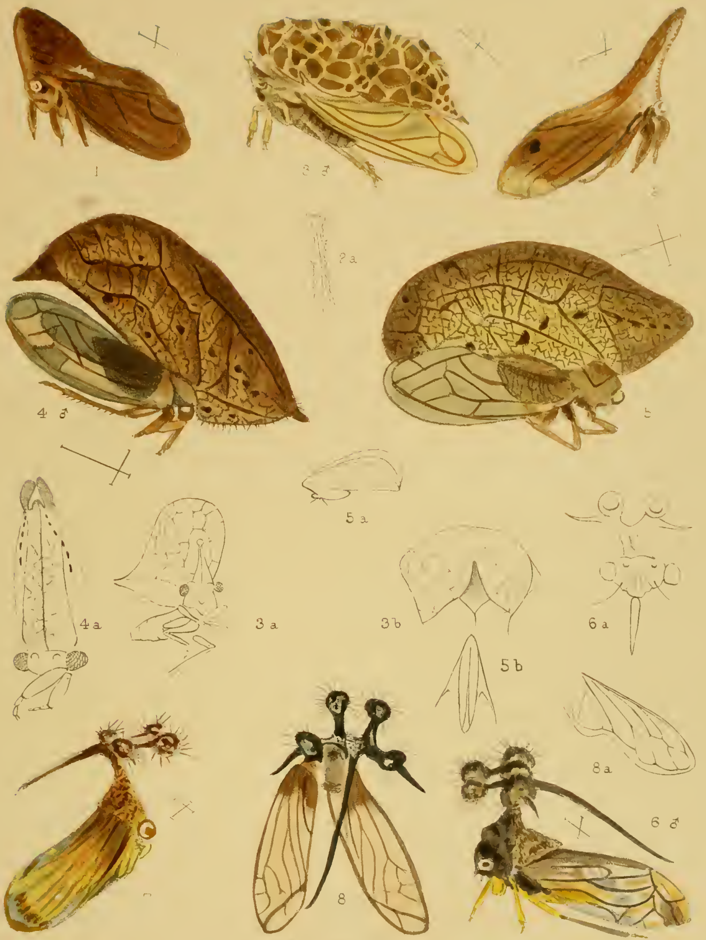
Fig. 6*a.* The five remarkable spiked balls affixed to the head. The short pronotum does not cover the scutellum.

Fig. 7. *Bocydium rufiglobum,* page 208.

Fig. 8. *Bocydium globulare,* with the pronotum detached from the body, and showing the neuration of the tegmina, page 209.

Fig. 8*a.* Wing of the same.

PLATE XLV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7
8
6 ♂

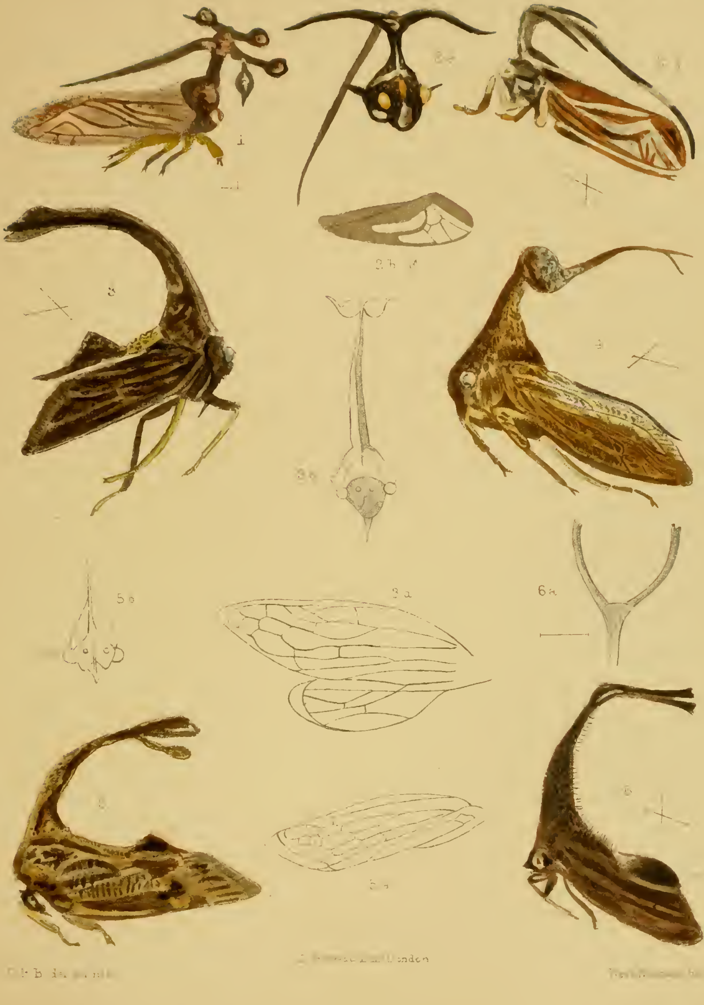
G. B. del. ad nat.

L. Reeve & C. Lim^d London

West Newman lith.

PLATE XLVI.

Fig. 1. *Bocydium grobulare*, page 209.
Fig. 2. *Bocydium* (*Stylocentrus*) *ancora*, page 209.
Fig. 2*a*. Head with its three processes.
Fig. 2*b*. The tegmen of the male insect.
Fig. 3. *Hypsauchenia Hardwickii*, page 210.
Fig. 3*a*. The tegmen and wing of the same.
Fig. 3*b*. The porrect cephalic horn.
Fig. 4. *Hypsauchenia bulbosa*, page 211.
Fig. 5. *Hypsauchenia subfusca*, page 211.
Fig. 5*a*. The tegmen.
Fig. 5*b*. Head and frons.
Fig. 6. *Hypsauchenia Westwoodii*, page 211.
Fig. 6*a*. The summit of the procephalon.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G. B. B. del. et lith.

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PLATE XLVII.

Fig. 1. *Hypsauchenia pygmæa*, ♂, with its strongly developed procephalic process, and also its posterior pronotal process, page 211.

Fig. 2. *Hypsauchenia anodonta*, ♂, with its unarmed posterior pronotal process, page 212.

Fig. 2*a*. Apex of the procephalon, front aspect.

Fig. 2*b*. Tail of the male.

Fig. 3. Tegmen and wing of *Hypsauchenia asper*, page 212.

Fig. 3*a*. Head,* spatulate tibiæ, and part of the rough procephalon of the same insect.

Fig. 4. *Lycoderes anchora*, of Germar, probably the male of *Lycoderes furca*, page 201. (See Plate XLIV. fig. 4.)

Fig. 4*a*. The same insect seen in profile.

Fig. 4*b*. The apex of the procephalon.

Fig. 5. *Lamproptera stylata*. The erect dorsal process on the pronotum is remarkable, page 212.

Fig. 5*a*. The frons and short horns on the head.

Fig. 6. *Micreune formidendum*, page 213.

Fig. 6*a*. The front aspect, with the cleft procephalon and dorsal process.

Fig. 7. *Micreune macularum*, page 214.

Fig. 7*a*. The procephalon with its trifid processes.

Fig. 7*b*. The very short pronotum, exposing the scutellum below it. The dorsal horn is not here drawn.

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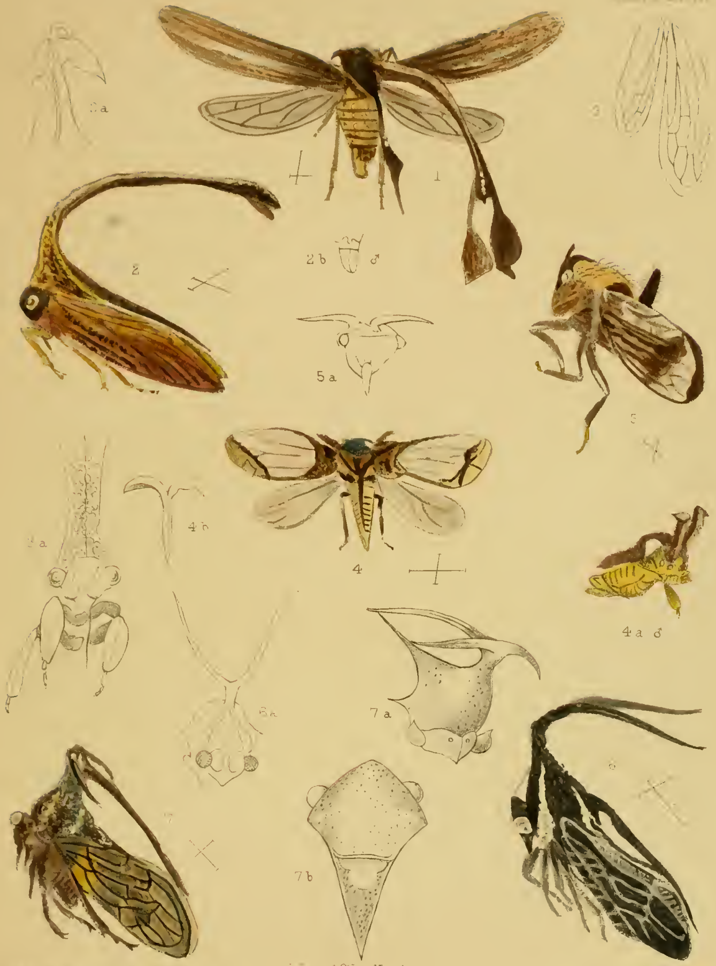
* The spatulate tibiæ here are abnormal.

PLATE [illegible]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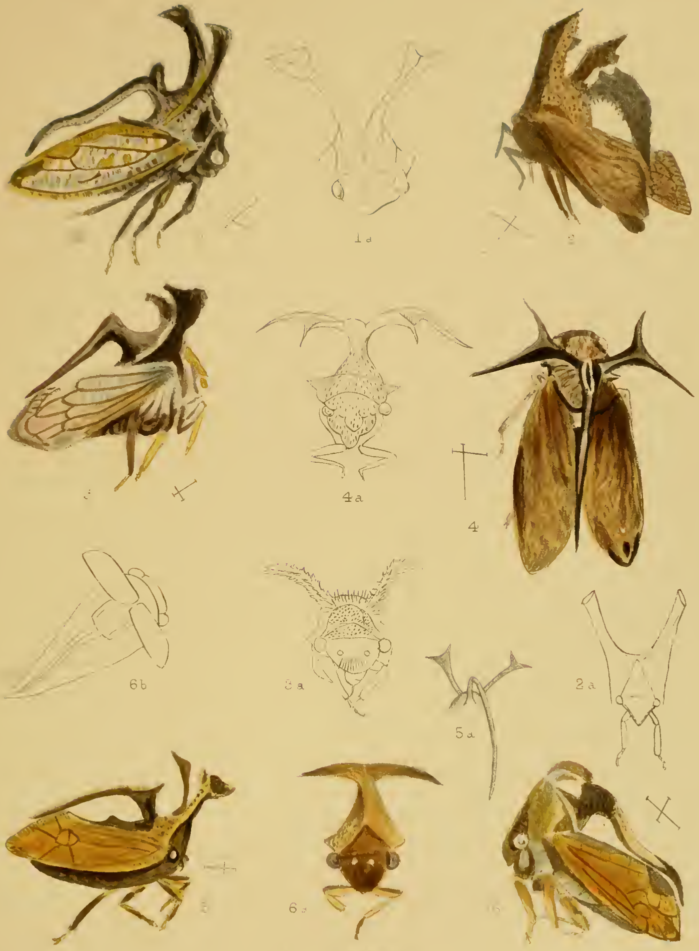
West, Newman lith

PLATE XLVIII.

Fig. 1. *Anchon nodicornis*, page 215.
Fig. 1*a*. Head and tri-carinated processes.
Fig. 2. *Kleidos vomeris*, page 214.
Fig. 2*a*. Head and frons.
Fig. 3. *Anchon rectangulatum*, page 215.
Fig. 3*a*. Head serrated horns and the legs of the same.
Fig. 4. *Elaphiceps cervus*, page 217.
Fig. 4*a*. Antlered horns of the pronotum.
Fig. 5. *Anchon remigium*, page 215.
Fig. 5*a*. The dorsal view of the processes.
Fig. 6. *Anchon albolineatum*, page 216.
Fig. 6*a*. The front view of head and adjuncts.
Fig. 6*b*. The dorsal view of the pronotum with the flattened horns and the posterior process which does not cover the scutellum.

PLATE XLVIII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G.E.F. del. ad nat.

L. Reeve & C° Ltd London

Newman lith.

PLATE XLIX.

Fig. 1. *Anchon ulniforme*, page 216.

Fig. 1*a*. The head and suprahumerals.

Fig. 2. *Anchon dirce*.

Fig. 3. *Oxyrhachis tarandus*, page 223.

Fig. 3*a*. Tegmen and wing.

Fig. 3*b*. Head of the same.

Fig. 4. *Oxyrhachis concolor*, page 224.

Fig. 4*a*. Front view of the head and forelegs.

Fig. 5. *Oxyrhachis neglectus*, page 224.

Fig. 5*a*. Dorsal view of the same.

Fig. 6. *Oxyrhachis lignicola*, page 224.

Fig. 6*a*. Frons with the metopidium and horns.

Fig. 6*b*. Tegmen with its corrugated limbus.

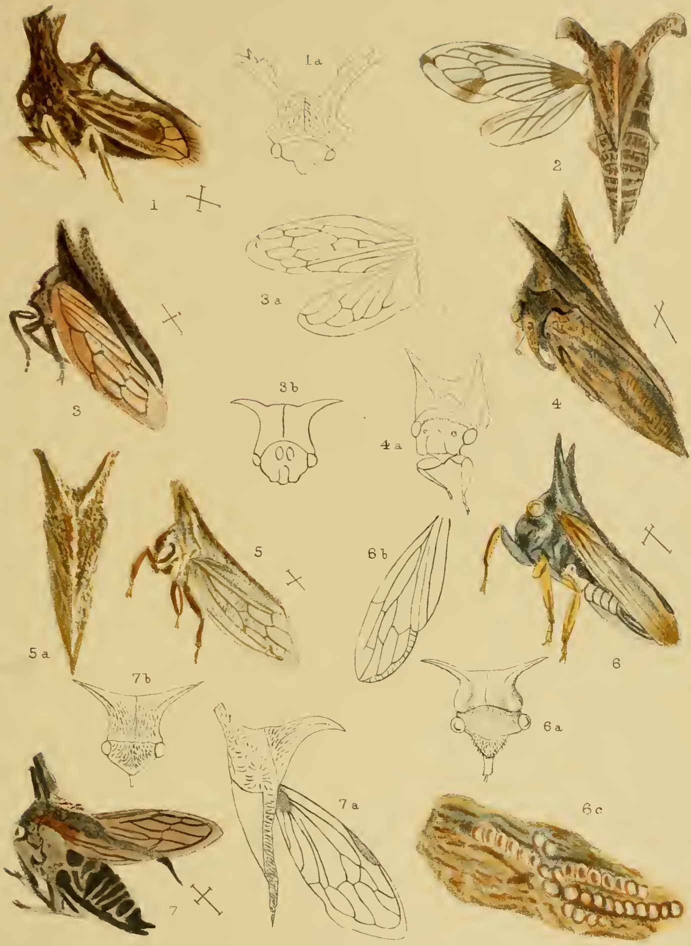
Fig. 6*c*. Fragment of wood showing ova deposited in channelled grooves, some of which are empty shells from which the perfect insects have escaped.

Fig. 7. *Oxyrhachis tanganensis*, page 225.

Fig. 7*a*. Dorsal view with a tegmen.

Fig. 7*b*. Head with the hirsute metopidium.

PLATE XLIX.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G B B del. ad nat

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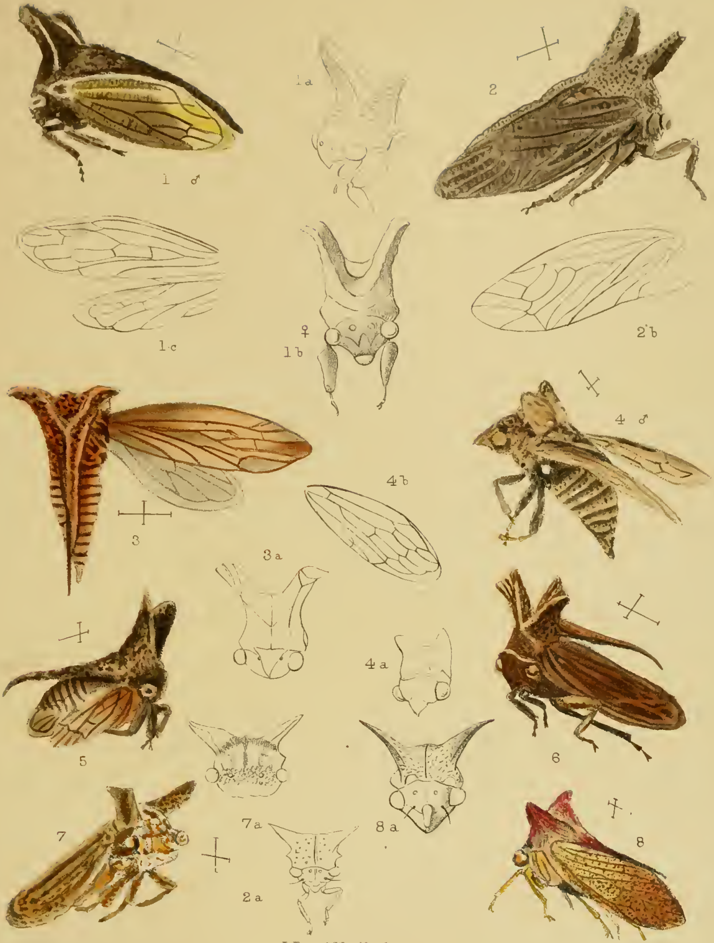
West, Newman imp.

PLATE L.

Fig. 1. *Daunus decisus*, pages 225 and 226.
Fig. 1*a*. Head and suprahumerals of the male.
Fig. 1*b*. Front view of the female.
Fig. 1*c*. Tegmen and wing of the same.
Fig. 2. *Daunus granulatus*, page 226.
Fig. 2*a*. Head and legs.
Fig. 2*b*. Tegmen of the same.
Fig. 3. *Daunus succisus*, page 226.
Fig. 3*a*. Head with its truncated suprahumerals.
Fig. 4. *Daunus nodosus*, page 226.
Fig. 4*a*. Head with the blunt horns.
Fig. 4*b*. Tegmen of the same.
Fig. 5. *Daunus pallidus*, page 227.
Fig. 6. *Centruchoides tasmaniæ*, page 227.
Fig. 7. *Centruchoides laticornis* of Fowler, page 227.
Fig. 7*a*. Head and tomentose frons.
Fig. 8. *Sextius cupreus*, page 228.
Fig. 8. Frons, rostrum, and antennæ.

PLATE L.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8 a
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G B B. del ad nat
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PLATE LI.

Fig. 1. *Ceraon tumescens.* The flattened suprahumerals appear most marked from the front aspect, page 229.

Fig. 1*a*. The head and frons.

Fig. 1*b*. The tegmen with its short transverse neuration.

Fig. 2. *Ceraon contortum*, seen from the dorsal aspect, page 229.

Fig. 3. *Sextius virescens.* In figure this insect is not unlike *S. cupræus* of Plate L.

Fig. 4. *Pterosticta rubrilinea*, with obtuse suprahumeral processes, page 230.

Fig. 5. *Pterosticta spreta*, page 230.

Fig. 5*a*. The pointed tegmen with the radial nervures, which are much subdivided by short transverse nervures.

Fig. 5*b*. The fuscous frons. The suprahumerals are united by a dark bar.

Fig. 6. *Pterosticta rubridorsata*, page 230.

Fig. 6*a*. The head and frons.

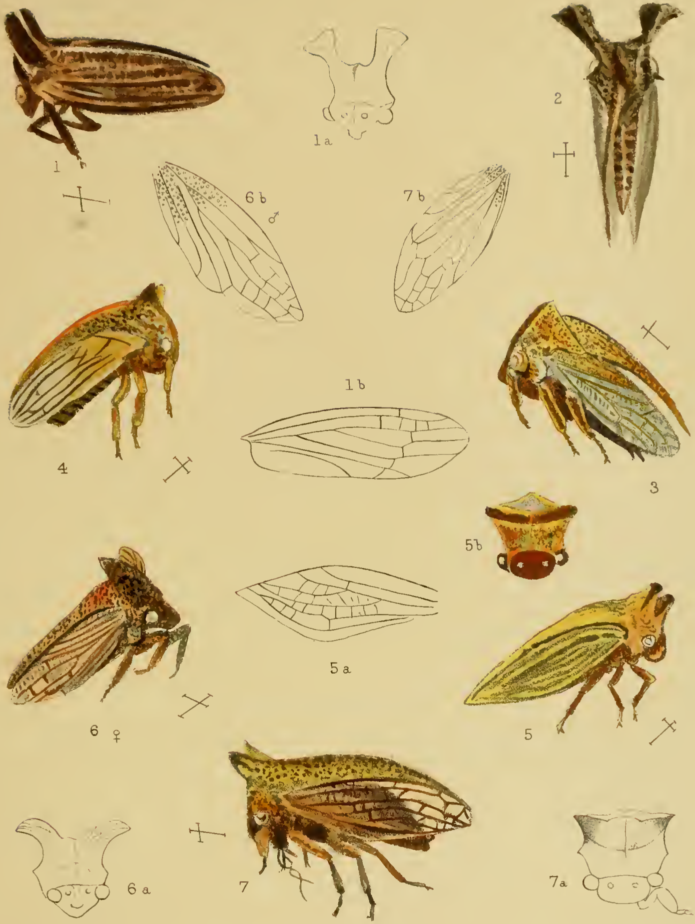
Fig. 6*b*. The tegmen, showing the punctured character of the base and the costa.

Fig. 7. *Pterosticta xantha*, showing its strongly punctured pronotum, and the exserted bristles of its rostrum, page 231.

Fig. 7*a*. Frons with its short suprahumerals.

Fig. 7*b*. Tegmen of the same with its abnormal neuration.

PLATE LI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7a

G.B.B. del ad nat.
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West, Newman imp

PLATE LII.

Fig. 1. *Pterosticta interposita.* The female, page 231.

Fig. 1*a*. The male is smaller than the female, and does not show (or very slightly) the humeral processes.

Fig. 1*b*. Head and frons of the female.

Fig. 2. *Megaloschema laticornis* may be distinguished by the broad pronotum.

Fig. 3. *Otinotus belus*, page 232.

Fig. 3*a*. The broad metopidium may be noted.

Fig. 4. *Otinotus pallipes*, page 232.

Fig. 4*a*. The head and suprahumerals.

Fig. 5. *Otinotus exigua*, the imago, page 232.

Fig. 5*a*. The larva with a conical pronotum, and serrated edges to the abdomen. These two figures are drawn too large in their proportions with respect to the other figures on this plate.

Fig. 6. *Otinotus ammon*, page 233.

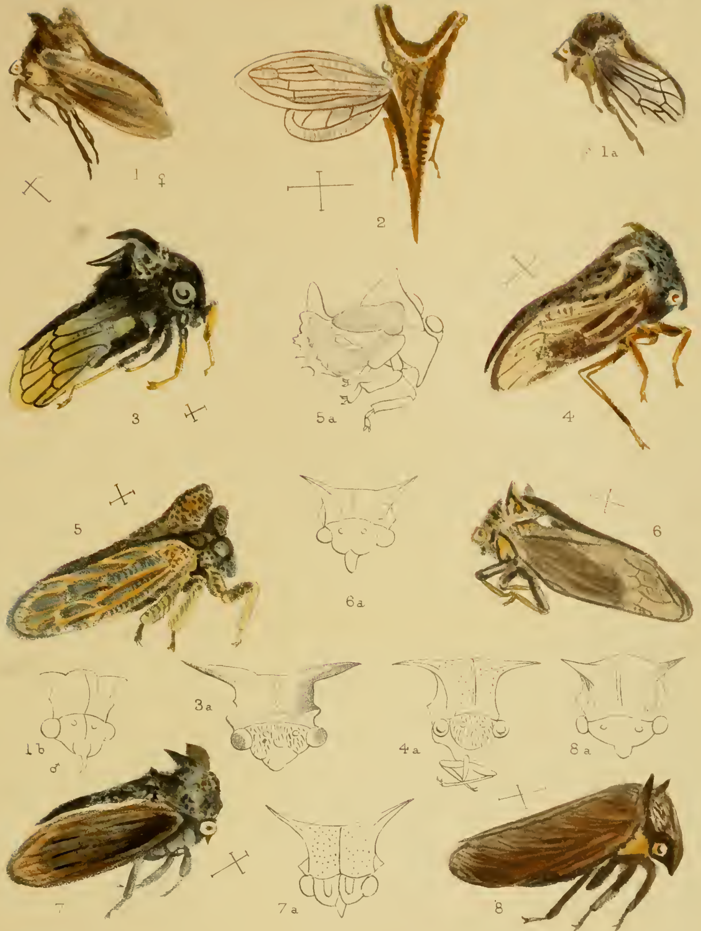
Fig. 6*a*. Head and frons of the same.

Fig. 7. *Otinotus pactolus*, page 233.

Fig. 7*a*. The head and metopidium.

Fig. 8. *Otinotus midas*, page 233.

Fig. 8*a*. Front view of the head and frons.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G.B.B. del ad nat

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PLATE LIII.

Fig. 1. *Leptocentrus canescens*, page 234. The long taper posterior horn may be noted in this genus and the developed suprahumeral processes.

Fig. 2. *Leptocentrus imitator*, page 234.

Fig. 2*a*. The tegmen.

Fig. 3. *Leptocentrus leucaspis* ♀, page 235.

Fig. 3*a*. Frons. The suprahumeral horns are unevenly long, from perspective drawing.

Fig. 3*b*. Posterior horn, suprahumerals, and part of the uncovered scutellum.

Fig. 4. *Leptocentrus mephistopheles*, from the dorsal view, page 235.

Fig. 5. *Leptocentrus gazella* ♀, with portions of the wings, page 235.

Fig. 5*a*. Head and processes. The foreheads of these insects are always more or less prone, or turned downwards. If the view is taken from above, the posterior horn appears as seen in this figure.

Fig. 6. *Leptocentrus aduncus*, with the short posterior horn, page 236.

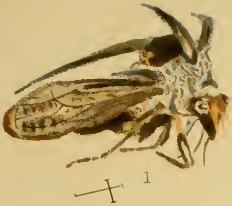
Fig. 7. *Leptocentrus ustus*, page 236.

Fig. 8. *Leptocentrus cinctus*, page 236.

Fig. 8*a*. The tegmen.

Fig. 8*b*. The frons and suprahumerals.

PLATE LIII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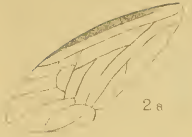
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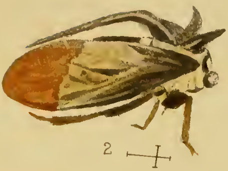
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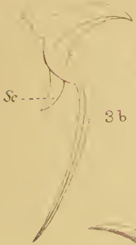

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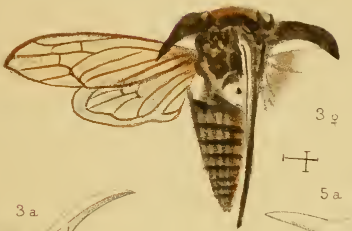
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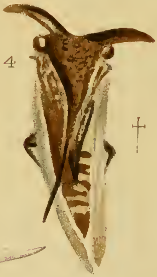
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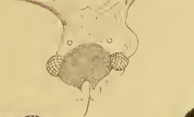
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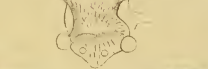
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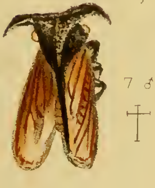
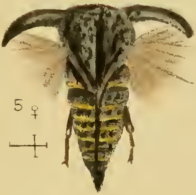

7 ♂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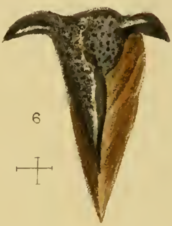
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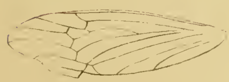
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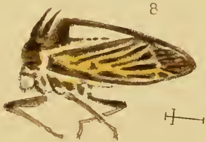
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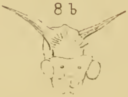
8 b

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L Reeve & Cº Limd London

West, Newman lith

PLATE LIV.

Fig. 1. *Centrotypus flexuosus* ♀, page 237.

Fig. 1*a*. Head, bearded frons, and suprahumerals.

Fig. 2. *Centrotypus alatus*, page 237.

Fig. 2*a*. Front view of the expanded processes.

Fig. 3. *Centrotypus tibialis*, page 238. The suprahumeral processes here are less flattened and the costal parts of the tegmina are denser in structure.

Fig. 3*a*. The high metopidium, which is very pilose.

Fig. 4. *Centrotypus securis*, page 238.

Fig. 4*a*. Remarkable for the pick-axe form of the punctured pronotum.

Fig. 5. *Centrotypus ater*, page 238. Part of the pronotum and process with the tegmen and wing of one side. These are coarsely veined.

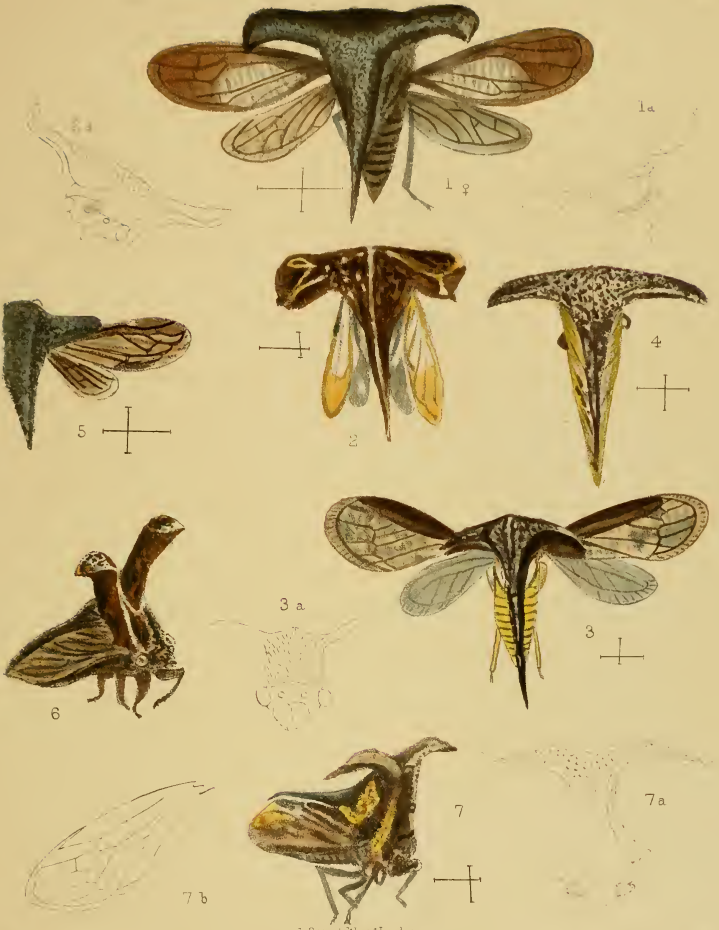
Fig. 6. *Ibiceps falcatus*, with its curved and slightly flattened processes, page 239.

Fig. 7. *Ibiceps ansatus*, with its goat-like horns, page 239.

Fig. 7*a*. The frons and high metopidium, which is almost cephalic in character, of the same insect.

Fig. 7*b*. The tegmen of the same.

PLATE LI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West Newman

PLATE LV.

Fig. 1. *Ibiceps labatus*, page 239.

Fig. 1*a*. The head, frons, and processes, which last lose their curved form by the front view.

Fig. 2. *Ibiceps urus*, page 240.

Fig. 3. *Ibiceps laminifer*, page 240.

Fig. 3*a*. The broad, thin and flat suprahumerals are to be noted.

Fig. 3*b*. Frons and head of the same species.

Fig. 4. *Daimon satyrus*, remarkable for its serrated dorsum, which is garnished with a conspicuous uncinate claw, page 240.

Fig. 4*a*. Head, metopidium, and palmate suprahumeral horns.

Fig. 4*b*. Dorsal aspect of the same insect.

Fig. 5. *Smerdalea horrescens*, page 241.

Fig. 5*a*. Corrugated head and frons of the same remarkable species.

Fig. 6. *Campylocentrus hamifer*, page 241.

Fig. 6*a*. Frons and head.

Fig. 7. Profile view of the same insect.

Fig. 8. *Campylocentrus cavipennis*, page 242. The large node on the undersurface of the posterior horn is characteristic of this genus.

Fig. 8*a*. Head and frons.

PLATE LV.

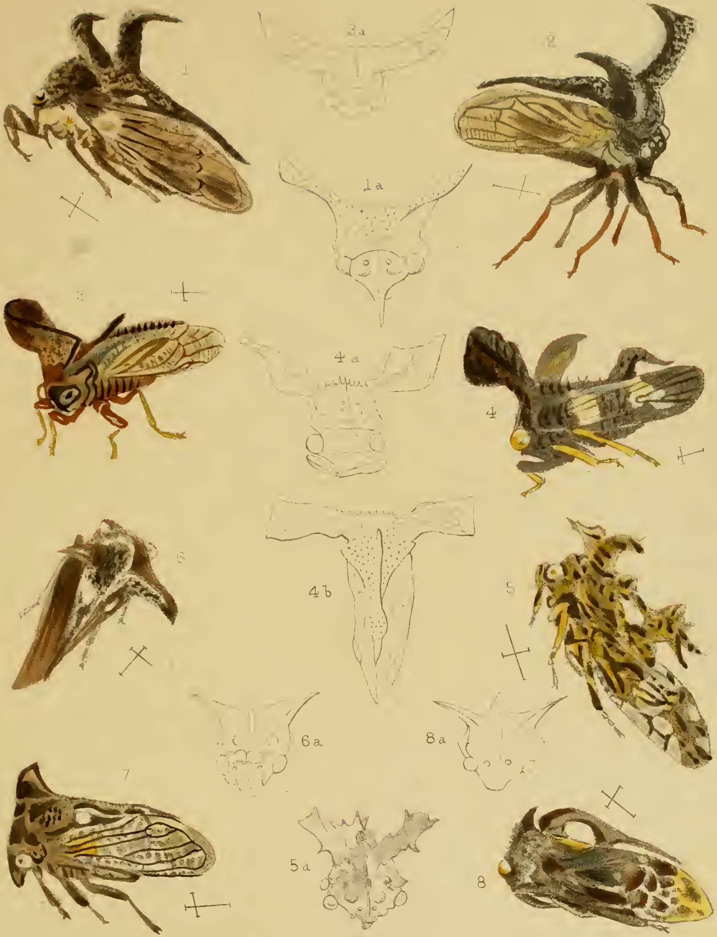
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PLATE LVI.

Fig. 1. *Campylocentrus sinuatus.* Canon Fowler describes this insect under his new genus *Gnamptocentrus,* page 242.

Fig. 1*a.* The head and frons.

Fig. 2. *Campylocentrus falco,* page 243.

Fig. 2*a.* Frons and hirsute metopidium.

Fig. 3. *Campylocentrus rugosus.* The membranes of the tegmina are much corrugated, page 243.

Fig. 3*a.* Head and adjuncts of the insect.

Fig. 4. *Sphærocentrus curvidens,* probably a variety of the next species, page 243.

Fig. 5. *Sphærocentrus curvidens,* B.M., page 244.

Fig. 5*a.* Head, pilose frons and obtuse suprahumerals of the same.

Fig. 6. *Sphærocentrus luteus,* page 244.

Fig. 6*a.* Finely tuberculated head of the same.

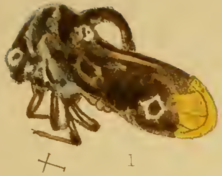
Fig. 7. *Centrotus cornutus,* with characters allied to *Campylocentrus,* page 245.

Fig. 7*a.* Neuration of the tegmen.

Fig. 7*b.* Head and frons.

Fig. 8. *Tricoceps brunneipennis,* page 249.

Fig. 8*a.* The high metopidium, hirsute frons, and suprahumerals of the insect may be noticed.



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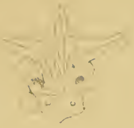

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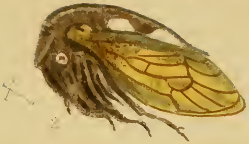

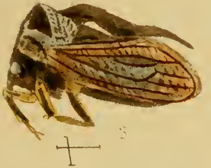

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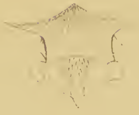

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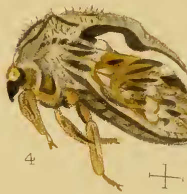

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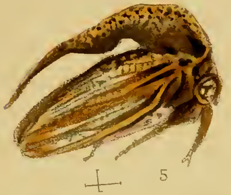

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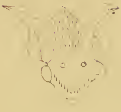

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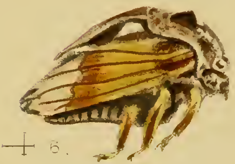

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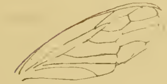

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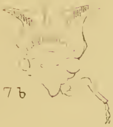

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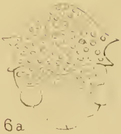

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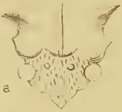

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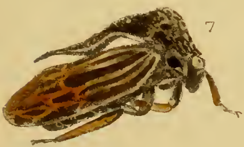

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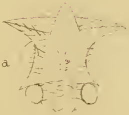

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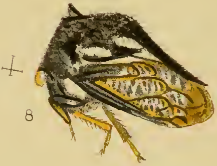

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PLATE LVII.

Fig. 1. *Ophicentrus raripennis*, page 250.

Fig. 1*a*. The frons and pilose metopidium with the suprahumerals by front aspect.

Fig. 2. *Ophicentrus trispinifer*, page 250.

Fig. 2*a*. Head by the front aspect.

Fig. 3. *Ophicentrus curvicornis*, page 250.

Fig. 3*a*. Frons and pronotal adjuncts.

Fig. 4. *Rabduchus gnomon*, page 251.

Fig. 4*a*. Dorsal view of the insect.

Fig. 4*b*. Frons and metopidium.

Fig. 5. *Pedalion triste*, page 252.

Fig. 5*a*. Head with the short suprahumerals.

Fig. 6. *Pedalion ornatum*, page 252.

Fig. 6*a*. The rudder-like posterior horn is typical of this genus.

Fig. 7. *Pedalion delalandei*, page 252.

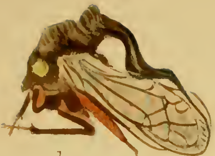
Fig. 7*a*. The obtuse suprahumerals.

Fig. 8. *Pedalion punctipennis*, page 253.

Fig. 8*a*. Frons with spotted metopidium.

N.B.—Although Pedalion is preoccupied as a generic name, I retain it on account of its descriptive character. As an insect-genus it can scarcely be confounded with either a fish or a mollusk.

PLATE IV.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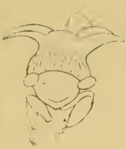
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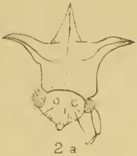
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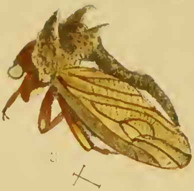
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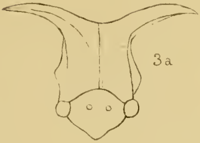
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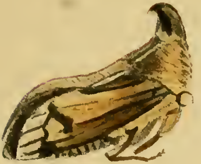
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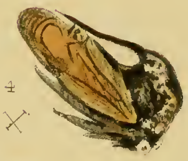
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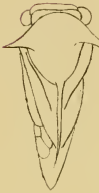
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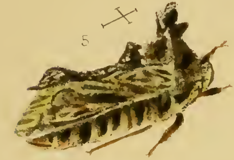
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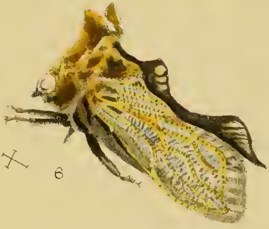
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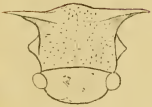

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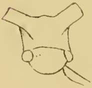

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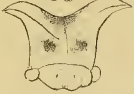

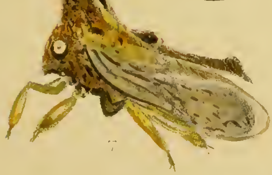
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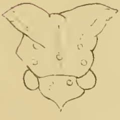

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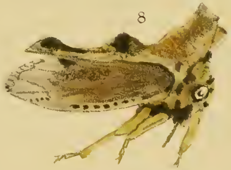

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PLATE LVIII.

Fig. 1. *Polocentrus latipes.* The broad clubbed posterior horn may be noted, page 253.

Fig. 1*a*. Head and frons.

Fig. 2. *Polocentrus rufus.* This specimen may be taken as typical, page 254.

Fig. 2*a*. Hirsute frons and suprahumerals.

Fig. 2*b*. Neuration of the tegmina.

Fig. 3. *Polocentrus neuter.* This example is defective in its posterior horn, page 254.

Fig. 3*a*. Frons and humeral processes.

Fig. 4. *Centrotus nectaris*, page 246.

Fig. 4*a*. Larva of the same with its anal tube partially retracted. The suprahumeral processes are as yet undeveloped.

Fig. 4*b*. The frons of the adult insect seen rather prone.

Fig. 5. *Pyramba aurifacies*, page 248.

Fig. 5*a*. Dorsal aspect of the pronotum, and the posterior horn.

Fig. 6. *Pogon incurvatum*, page 248.

Fig. 6*a*. The dorsal view of the same. The posterior horn is obsolete or else very short, and the scutellum is exposed.

Fig. 6*b*. Front view with the legs.

Fig. 6*c*. Tegmen with its peculiar neuration.

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PLATE LVIII.

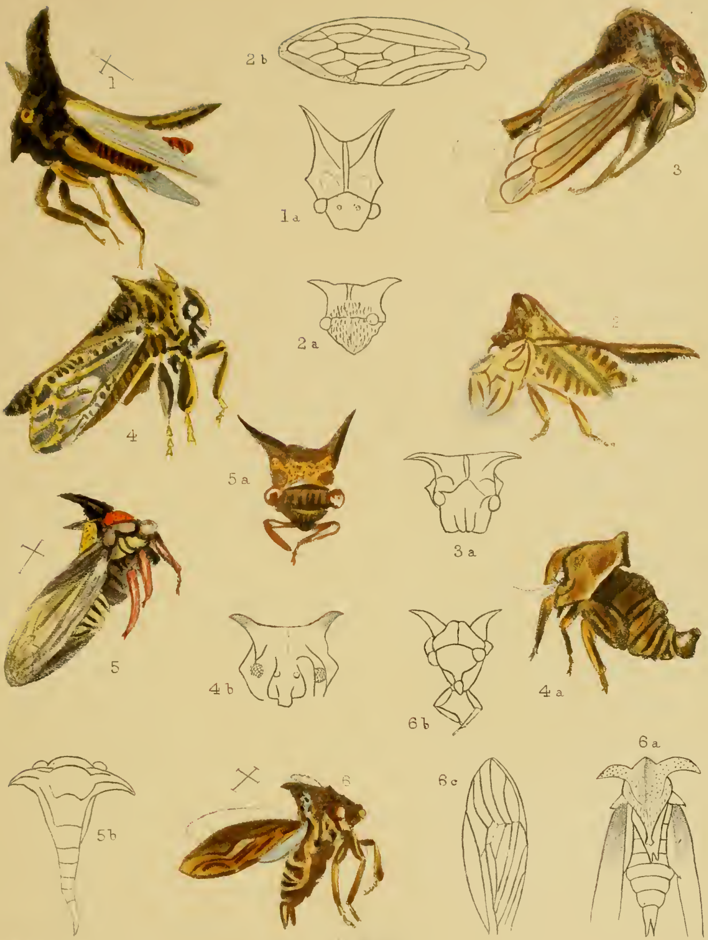
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PLATE LIX.

Fig. 1. *Otaris auritus*. The widely expanded suprahumerals and the short posterior horn well mark this genus from *Hoplophora cineria*, a species to which it has some resemblance, page 249.

Fig. 1*a*. Head and suprahumeral horns.

Fig. 2. *Ischnocentrus inconspicuus*, page 255.

Fig. 2*a*. Front view with the legs.

Fig. 3. *Phærotus stipulipennis*, page 255.

Fig. 3*a*. Globose form by the back view.

Fig. 3*b*. Pronotum without processes.

Fig. 3*c*. Tegmen with its clouded membrane, and veining furnished with small tuberculate nodules.

Fig. 4. *Ischnocentrus niger*, page 255.

Fig. 5. *Psilocentrus xantipe*, page 256.

Fig. 5*a*. Head and frons.

Fig. 6. *Emphusis tumescens* ♀, page 256.

Fig. 6*a*. The dorsal aspect of the same.

Fig. 6*a*. (*bis*). Tegmen and wing with their coarse neuration.

Fig. 6*b*. Frons and inflated metopidium.

Fig. 7. *Phaulocentrus pileatus*. Dorsal view, page 257.

Fig. 7*a*. Frons and punctured metopidium.

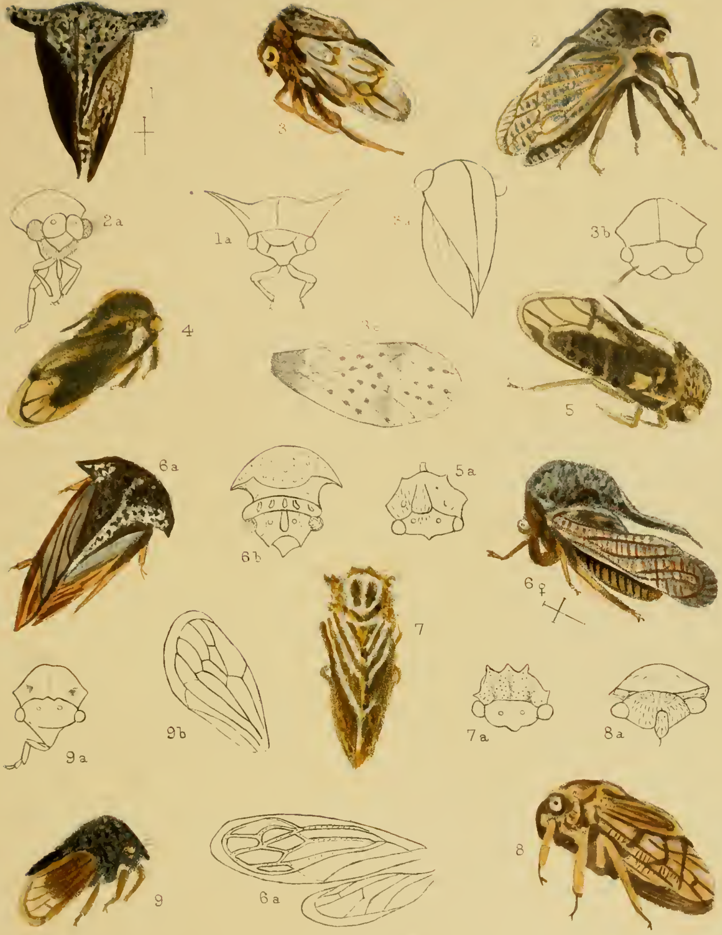
Fig. 8. *Mærops mixta*, page 257.

Fig. 8*a*. Front aspect of the insect.

Fig. 9. *Gargara genistæ*, page 258.

Fig. 9*a*. The frons and fore-leg.

Fig. 9*b*. Tegmen of the same.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G.B.B. del

L. Reeve & C° Lim^d London

West, Newman lith.

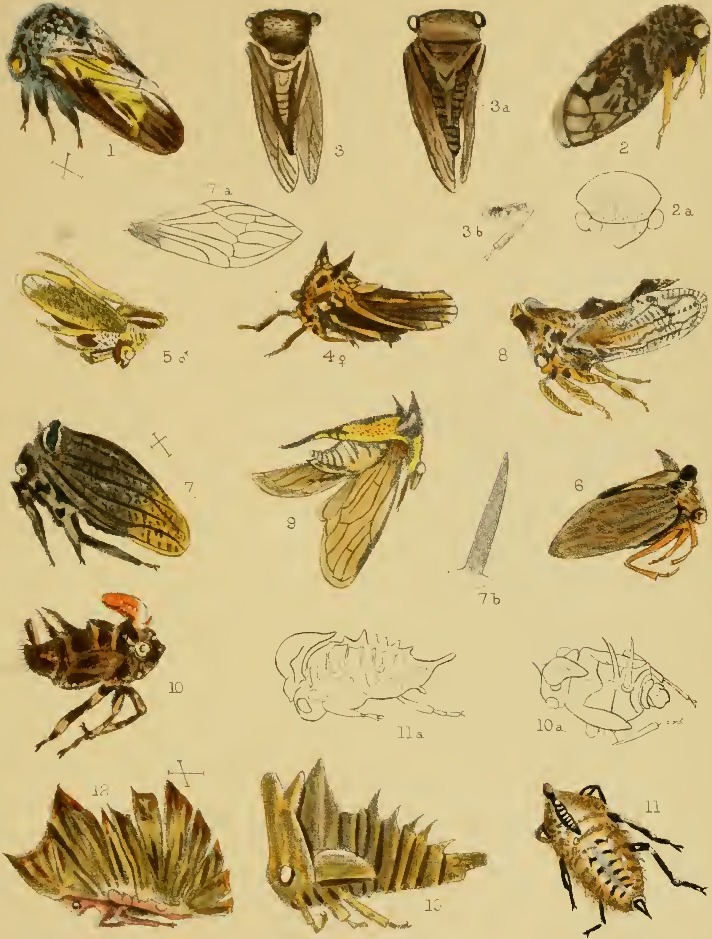
PLATE LX.

Fig. 1. *Brachybelus micans.*
Fig. 2. *Brachybelus cruralis*, page 258.
Fig. 2*a*. Frons and pilose metopidium.
Fig. 3. *Tolania obtusa*, page 259.
Fig. 3*a*. *Tolania.*
Fig. 3*b*. Femur and tibia of the same insects.
Fig. 4. *Tolania opponens* ♀, horned, page 259.
Fig. 5. *Centrotus crinatus*, page 247.
Fig. 6. *Centrotus selenus*, page 247.
Fig. 7. *Centrotus orcus* (?), page 247.
Fig. 7*a*. Tegmen of the same insect.
Fig. 7*b*. Short abnormal posterior horns.
Fig. 8. *Pedalion fasciatum*, page 253.
Fig. 9. *Taurion obesum*, page 259.

PUPÆ and LARVÆ.

Fig. 10. Pupa of an unknown species of Membracis, page 261.
Fig. 10*a*. With a clavate process on the pronotum.
Fig. 11. Hirsute larva with a serrated dorsum, page 261.
Fig. 11*a*. And horn, similar to the last.
Fig. 12. Probably the pupa of an unknown species of the genus Membracis, page 260.
Fig. 12*a*. The pronotal disc is singularly cleft.
Fig. 13. Pupa of an unknown Membracis, page 260.
Fig. 13*a*. The disc here is much developed anteriorly, but posteriorly it is represented by sharp spines.

PLATE LX.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